CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report / Environmental Impact Statement

Working Draft

Preliminary Fresno to Bakersfield **Alternatives Analysis Report**

Volume 1

June 2010

California High-Speed Rail Authority

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Without ever leaving the ground.

U.S. Department of Transportation
Federal Railroad Administration

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California High-Speed Train Project

Fresno to Bakersfield Section

PRELIMINARY ALTERNATIVES ANALYSIS REPORT

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Revision	Date	Description

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ABBREVIATIONS/ACRONYMS

Amtrak.....National Railroad Passenger Corporation
APE.....Area of Potential Effect
Authority.....California High-Speed Rail Authority
BFL.....Bakersfield Meadows Field Airport
BNSF .....BNSF Railway Company
BRT .....bus rapid transit
CAHST.....California High-Speed Train
Caltrans.....California Department of Transportation
CEQA.....California Environmental Quality Act
CHRIS.....California Historical Resources Information System
COG.....Council of Governments
EIR .....Environmental Impact Report
EIS .....Environmental Impact Statement
FAA.....Federal Aviation Administration
FARRC .....Fresno Area Residents for Rail Consolidation
FAT.....Fresno Yosemite International Airport
FRA.....Federal Railroad Administration
FSK.....Fowler, Selma, and Kingsburg
GIS.....Geographic Information System
HST .....High-Speed Train
I .....Interstate
ITIP.....Interregional Transportation Improvement Plan
LEDPA.....Least Environmentally Damaging Practicable Alternative
LOS .....Level of Service
LPA.....Locally Preferred Alternative
LRT.....light rail transit
mph.....Miles per Hour
NEPA .....National Environmental Policy Act
NRHP.....National Register of Historic Places
NWR.....National Wildlife Refuge
PMT.....Program Management Team
RTP .....Regional Transportation Plan
SECTION 4(f)....Section 4(f) of the U.S. Department of Transportation Act of 1966
SHP .....State Historic Park
SJVR.....San Joaquin Valley Railroad
SP.....Southern Pacific
SR .....State Route
STA.....Station
STIP .....State Transportation Improvement Program
TOD.....Transit-0Oriented Development
TWG.....Technical Working Group
US EPA .....U.S. Environmental Protection Agency
UPRR.....Union Pacific Railroad
USACE .....U.S. Army Corps of Engineers
USFWS .....U.S. Fish and Wildlife Service
USGS.....U.S. Geological Survey
VIS .....Visalia Municipal Airport

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ES.0 Executive Summary

ES.1 Results from the Preliminary Alternatives Analysis

This Preliminary Alternatives Analysis Report for the Fresno to Bakersfield Section incorporates conceptual engineering information and identifies feasible and practicable alternatives to carry forward for environmental review and evaluation in the draft environmental impact report/environmental impact statement (EIR/EIS) under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). For the purposes of this Alternatives Analysis, the Fresno to Bakersfield section was divided into three subsections from north to south:

- **Fresno Subsection** – Beginning at Clinton Avenue north of downtown Fresno and terminating in the vicinity of E. Manning Avenue south of Fresno (Figure ES-1).
- **Rural Subsection** – Beginning at E. Manning Avenue in Fresno and continuing south to Hageman Road in the community of Rosedale on the northwestern outskirts of Bakersfield (Figure ES-2).
- **Bakersfield Subsection** – Beginning at Hageman Road, continuing southeast through downtown Bakersfield and terminating at Oswell Street, southeast of downtown (Figure ES-3).

The study limits extend for approximately three miles north of the Fresno station and three miles southeast of the Bakersfield station in order to fully consider alignment alternatives in those areas. In both cases, the limits correspond to points where multiple options are reduced to a single alignment for a short distance.

A Heavy Maintenance Facility (HMF) for High-Speed Train rolling stock will be situated within the Central Valley between Merced and Bakersfield. In November 2009, based on specific site and facility requirements, the Authority solicited Expressions of Interest (EOI) from parties between Merced and Bakersfield who could provide proposals where the HMF could be located. Within the Fresno to Bakersfield Section of the High-Speed Train (HST) system, proposals for eight sites were received (Figure ES-4).

The following alignment alternatives are recommended to be carried forward for detailed study in the Fresno to Bakersfield Section HST Project EIR/EIS (Figure ES-4). .

- **Fresno Subsection**
  - Elevated UPRR West / BNSF South
  - Elevated UPRR East / BNSF South
  - UPRR West/UPRR East Crossover Alternative (Combination of UPRR West and UPRR East)

- All recommended alternatives through Fresno are elevated, run adjacent to the Union Pacific Railroad, and provide for a station in downtown Fresno near Mariposa Street, the City's desired location.

- **Rural Subsection**

  Full-Length Alignment
  - BNSF Route, West Side Shared Right-of-Way, Bypass east side of Hanford

  - Local Options
    - Through Corcoran, East Side of BNSF, Elevated
    - Corcoran East Bypass, At-Grade
    - Allensworth Bypass Alternative, At-Grade (west of BNSF corridor)

  - Through Wasco and Shafter, Elevated
  - Wasco and Shafter Bypass, At-Grade

- Recommended Rural Subsection alternatives are largely at grade and parallel the existing BNSF Railway where possible, including sections where BNSF right-of-way is shared. Through-town (elevated) and bypass (at-grade) options are retained in the vicinity of small communities (Corcoran, Wasco, and Shafter). A bypass is also provided in the vicinity of Allensworth State Historic Park and Pixley National Wildlife Refuge. All alternatives allow for a station in Kings County east of Hanford at SR-198.

- **Bakersfield Subsection**
  - Through BNSF Yard, North of East Bakersfield, South of UPRR, Elevated
  - North of BNSF ROW, along California Avenue through East Bakersfield, South of UPRR, Elevated

- Recommended Bakersfield alternatives are both elevated; have slightly differing locations with respect to existing BNSF mainline and yard, major downtown buildings, and the low income community of East Bakersfield; and provide for a station adjacent to or near the existing Truxtun Avenue Amtrak station.

Heavy Maintenance Facility sites recommended for continued study are (Figure ES-4, from north to south):

- Fresno Works – Fresno
- Kings County – Hanford
- Kern Council of Governments – Wasco
- Kern Council of Governments — Shafter

Table ES-1 summarizes the findings and recommendations of this Alternatives Analysis for all alignment alternatives and HMF site alternatives considered.

ES.2 Alternative Analysis Evaluation Measures

The alignment alternatives, station locations, and design options carried forward into the detailed alternatives analysis were assessed for each of the project objectives and evaluation measures. This information was then used to determine which alternatives are feasible and practicable and should be carried forward into preliminary engineering design and environmental review as part of the EIR/EIS. The primary evaluation measures are listed below.

- Design objectives (including measures such as travel time and cost)
- Land use (including measures such as consistency with land use and general plans)
- Constructability (including measures such as track type construction and access to the corridor)
- Community impacts (including measures such as amount of land acquisition)
- Natural resources (including measures such as impacts to wetlands, potential threatened and endangered species habitat, and important farmlands)
- Environmental quality (including measures such as number of sensitive noise receptors)
- Additional considerations (including measures such as ability to meet project purpose and support by public and agencies)

ES.3 Fresno to Bakersfield High Speed Train Project Background

The 2005 Final Statewide Program EIR/EIS identified as a preferred alternative the BNSF alignment because it would have fewer constructability issues; fewer potential noise, cultural, community, and property impacts; and an estimated lower cost than Union Pacific Railroad (UPRR) alignment options. In discussing the BNSF alignment, the Program EIR/EIS noted that potential environmental impacts could be avoided and minimized if the HST system could reach agreements with BNSF to share the existing rail right-of-way to the greatest extent feasible. Although the preferred alternative identified no potential station between Fresno and Bakersfield, the Program EIR/EIS recommended a follow-up study to consider alignments that could serve a station in the Visalia area. Consistent with that recommendation, the Authority prepared the *Visalia-Tulare-Hanford Station Feasibility Study*, which identified potential station locations in the Kings–Tulare region and alignments that could serve those locations. The findings of that study are reflected in this Preliminary Alternatives Analysis.

ES.4 Public and Agency Outreach Efforts

The Authority and the FRA, in addition to performing engineering and environmental analysis, have engaged the agencies, public, and the communities throughout the corridor and continue to incorporate their input. In February 2009, the Authority and the FRA began a project-level environmental review of the Merced to Bakersfield HST Section per requirements of CEQA and NEPA. Scoping meetings were held in March 2009, to receive input on the scope of issues that should be analyzed in the EIR/EIS. The meetings were summarized in the Merced to Bakersfield High Speed Train Project EIR/EIS Scoping Report released in July 2009. Subsequent to issuance of that report, the Merced to Fresno and Fresno to Bakersfield Sections were separated to become two independent project-level environmental studies, and an amended scoping process for the Fresno to Bakersfield Section only was undertaken. The final scoping report for the Fresno to Bakersfield Section was issued in December 2009.

In addition, a number of agency, general public, and small group meetings were held throughout the Alternatives Analysis process. The purpose of these meetings was to explain the alternatives analysis process, share the results of the preliminary studies with the public and agencies, and receive feedback.

Input at these meetings and other comments were distilled to produce initial alignment alternatives and station and design options for consideration in this AA Report. Feedback from the public and agencies included issues such as noise, visual impacts, vibration, community cohesion, biological impacts, project cost and funding, right-of-way, and more.

ES.5 Next Steps

This Preliminary Alternatives Analysis Report Fresno to Bakersfield Section informs the Project Description for the EIR/EIS. It also sets parameters for the next level of design and environmental analysis. This ongoing work will provide the Authority, FRA and the communities in Fresno to Bakersfield Section more details and a fuller picture of both the design options in each subsection and a comprehensive vision of the entire corridor.

As the engineering and environmental work continues, the Authority will continue to meet and engage communities along the Fresno to Bakersfield corridor in a discussion about the different alternatives. If deemed necessary by the lead agencies, a supplemental Alternative Analysis report will consider feedback received on this Preliminary Alternative Analysis report and will discuss how the alternatives analysis will inform the detailed engineering, environmental and outreach activities in the Fresno to Bakersfield corridor. These activities will inform preparation of the draft EIR/EIS, which is currently scheduled for public comment in December 2010.

Table ES-1. Alignment Alternatives and Heavy Maintenance Facility Sites Considered

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incom-patibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
Fresno Subsection										
UPRR West / Elevated / BNSF	X									Visual and noise impacts; impact on 4(f) property (Roeding Park). Station further from downtown core (less desirable).
UPRR East / Elevated / BNSF	X									Visual and noise impacts; impact on historic 4(f) property (SP Depot Building). Station closest to downtown core (desired City location).
Golden State Blvd / Elevated / BNSF		X		P		S		S		Extensive community and cultural impact; located away from urban core; not preferred by City and stakeholders; more costly and complex construction.
UPRR West / Elevated / UPRR		X		S					P	Not compatible with selected alignments in Rural Subsection.
UPRR East / Elevated / UPRR		X		S					P	Not compatible with selected alignments in Rural Subsection.
Golden State Blvd / Elevated / UPRR		X		P		S		S	S	Community and cultural impacts; located away from downtown urban core; not preferred by City and stakeholders; costly and complex construction.
UPRR West / Mixed At-Grade & Elevated / BNSF		X	P						S	Displacements; road network severance; noise; community barrier effects.
UPRR East / Mixed At-Grade & Elevated / BNSF		X	P						S	Displacements; road network severance; noise; community barrier effects.
Golden State Blvd / Mixed At-Grade & Elevated / BNSF		X		P		S		S	S	Greatest community and cultural impact; located away from urban core; not preferred by City and stakeholders; costly and complex construction.
UPRR West / Mixed At-Grade & Elevated / UPRR		X	S						P	Not compatible with selected alignments in Rural Subsection.
UPRR East / Mixed At-Grade & Elevated / UPRR		X	S						P	Not compatible with selected alignments in Rural Subsection.
Golden State Blvd / Mixed At-Grade & Elevated / UPRR		X		P		S		S	S	Community and cultural impacts; located away from downtown urban core; not preferred by City and stakeholders; costly and complex construction.
UPRR West/UPRR East Crossover	X									Visual and noise impacts; costly and complex construction. No impacts on 4(f) properties. Station further from downtown core (less desirable).
Rural Subsection										
Full-Length Alignment Alternatives										
BNSF-Hanford East Bypass / Shared ROW	X									Greater construction complexity and cost; more coordination and mitigation of BNSF operational impacts required.
BNSF-Hanford East Bypass / Separate West Side Alignment		X			S			P	S	Alternative has greater ROW requirements and impacts more agricultural lands and natural resource lands than "Shared ROW" alternative. Separate HST ROW not feasible within rural communities of Corcoran, Wasco, and Shafter.
BNSF-Hanford East Bypass / Separate East Side Alignment		X			S			P	S	Alternative has greater ROW requirements and impacts more agricultural lands and natural resource lands than "Shared ROW" alternative. Separate HST ROW not feasible within rural communities of Corcoran, Wasco, and Shafter.
UPRR to BNSF / Shared ROW		X		P		S		S	S	UPRR corridor not selected due to (1) deviation from preferred Program EIR/EIS alignment, (2) extensively greater Greenfield construction, (3) moderately greater impacts on agricultural lands, and (4) greater cost and construction complexity.
UPRR to BNSF / Separate West Side Alignment		X		P		S		S	S	UPRR corridor not selected due to (1) deviation from preferred Program EIR/EIS alignment, (2) extensively greater Greenfield construction, (3) moderately greater impacts on agricultural lands, and (4) greater cost and construction complexity.
UPRR to BNSF / Separate East Side Alignment		X		P		S		S	S	UPRR corridor not selected due to (1) deviation from preferred Program EIR/EIS alignment, (2) extensively greater Greenfield construction, (3) moderately greater impacts on agricultural lands, and (4) greater cost and construction complexity.
Local Alignment Options										
Fowler/Selma/Kingsburg Greenfield Bypass		X		P		S		S	S	Not compatible with selected full-length alignment alternative.
Fowler/Selma/Kingsburg Near-Town Bypass		X		P		S		S	S	Not compatible with selected full-length alignment alternative.
Visalia 198 East Station Alignment		X		P		S		S	S	Not compatible with selected full-length alignment alternative.
99 Center Station (South of 198) Alignment		X		P		S		S	S	Not compatible with selected full-length alignment alternative.
99 North Station (Goshen) Alignment		X		P		S		S	S	Not compatible with selected full-length alignment alternative.
BNSF Hanford West Bypass (Modified Program Alignment)		X		S				P	S	Has agricultural impacts similar to Hanford East Bypass; conflicts with local land use plans; station site poorly serves Visalia Tulare area.

Table ES-1. Alignment Alternatives and Heavy Maintenance Facility Sites Considered

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incom-patibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
Corcoran Through Town (At-Grade)		X	P			S		P		Major intrusion through small community; loss of road network connectivity; extensive commercial and some residential displacement; inconsistent with BNSF operations and service to local customers; at-grade construction is costly and complex.
Corcoran Through Town (Elevated)	X									Visual and noise impacts; mitigation of BNSF numerous operations issues required; more complex and costly construction than bypass alternative.
Corcoran Bypass East Side of Town	X									Agricultural land acquisition and operations impacts; rural/county roadway network impacts.
Allensworth Bypass (West)	X									Greater impact on agricultural lands and that BNSF shared-ROW alternative; avoids numerous 4(f) resources (Allensworth SHP, Pixley NWF, and Allensworth Ecological Reserve); potentially greater impact on natural resources.
Wasco/Shafter Through Town (At-Grade)		X	P			S		P		Major intrusion through small community; loss of road network connectivity; extensive commercial and some residential displacement; inconsistent with BNSF operations and service to local customers; at-grade construction is costly and complex.
Wasco/Shafter Through Town (Elevated)	X									Visual and noise impacts; mitigation of BNSF numerous operations issues required; more complex and costly construction than bypass alternative.
Wasco East Bypass, Through Shafter (At-Grade)		X	P			S		P		Major intrusion through small community; loss of road network connectivity; extensive commercial and some residential displacement; inconsistent with BNSF operations and service to local customers; at-grade construction is costly and complex.
Wasco/Shafter East Bypass (At-Grade)	X									Agricultural land acquisition and operations impacts; rural/county roadway network impacts.
Wasco/Shafter Through Town (Elevated in Wasco At-Grade in Shafter)		X	P			S		P		Major intrusion through small community; loss of road network connectivity; extensive commercial and some residential displacement; inconsistent with BNSF operations and service to local customers; at-grade construction is costly and complex.
Wasco/Shafter Through Town (At-Grade in Wasco Elevated in Shafter)		X	P			S		P		Major intrusion through small community; loss of road network connectivity; extensive commercial and some residential displacement; inconsistent with BNSF operations and service to local customers; at-grade construction is costly and complex.
Wasco/Shafter/7th Standard Road East Bypass		X			S			P	S	Greenfield alignment; extensive acquisition of agricultural lands; impact on major planned and permitted mixed use development.
Bakersfield Subsection										
Through BNSF Yard / Adjacent to Amtrak Station / North of UPRR		X	P	S				S		Impacts on downtown activities and structures, including Bakersfield High School; impact on commercial property on north side of UPRR ROW; costly and complex construction to pass over UPRR right-of-way and Edison Hwy south of Kern Junction.
Through BNSF Yard / Adjacent to Amtrak Station / South of UPRR	X									Displacement of building on Bakersfield High School campus; visual and noise impacts throughout Bakersfield.
North of BNSF Right-of-Way/ One Block South of Amtrak Station / South of UPRR	X									Visual and noise impacts throughout Bakersfield; residential and commercial displacement in East Bakersfield (EJ community).
Over BNSF Main Line / One Block South of Amtrak Station / South of UPRR		X	P					S		Impacts on downtown activities and structures, including Bakersfield High School; impact on east Bakersfield EJ community greater than alignments carried forward; costly and complex construction to pass over BNSF mainline across downtown Bakersfield.
Heavy Maintenance Facility Sites (North to South)										
Fresno Works – Fresno	X									Acquisition of agricultural land.
Kings County EDC – Hanford	X									Acquisition of agricultural land.
Schuil & Associates – Angiola		X	P							Insufficient size; near sensitive natural resources; limited access to utilities and workforce; incompatible soils.
City of Allensworth Development Group LLC – Allensworth		X				S			P	Located near sensitive natural and cultural resources; most remote site: limited access to utilities and workforce; not accessible from Allensworth Bypass alignment; located on curve making connection difficult; poor soils.
Watson Touchstone Commercial Development – McFarland		X				P			S	Located 6.5 miles from nearest HST alignment alternative; 65% of site is within 100-year floodplain.
Kern Council of Governments – Wasco	X									Acquisition of agricultural land.
Kern Council of Governments – Shafter	X									Acquisition of agricultural land.
MUSE LLC – Bakersfield		X	S			P				Located 6 miles from nearest HST alignment; insufficient size; inconsistent with current and planned land use; inconsistent with freeway plans.

Figure ES-1. Fresno Subsection — Alignment Alternatives Considered

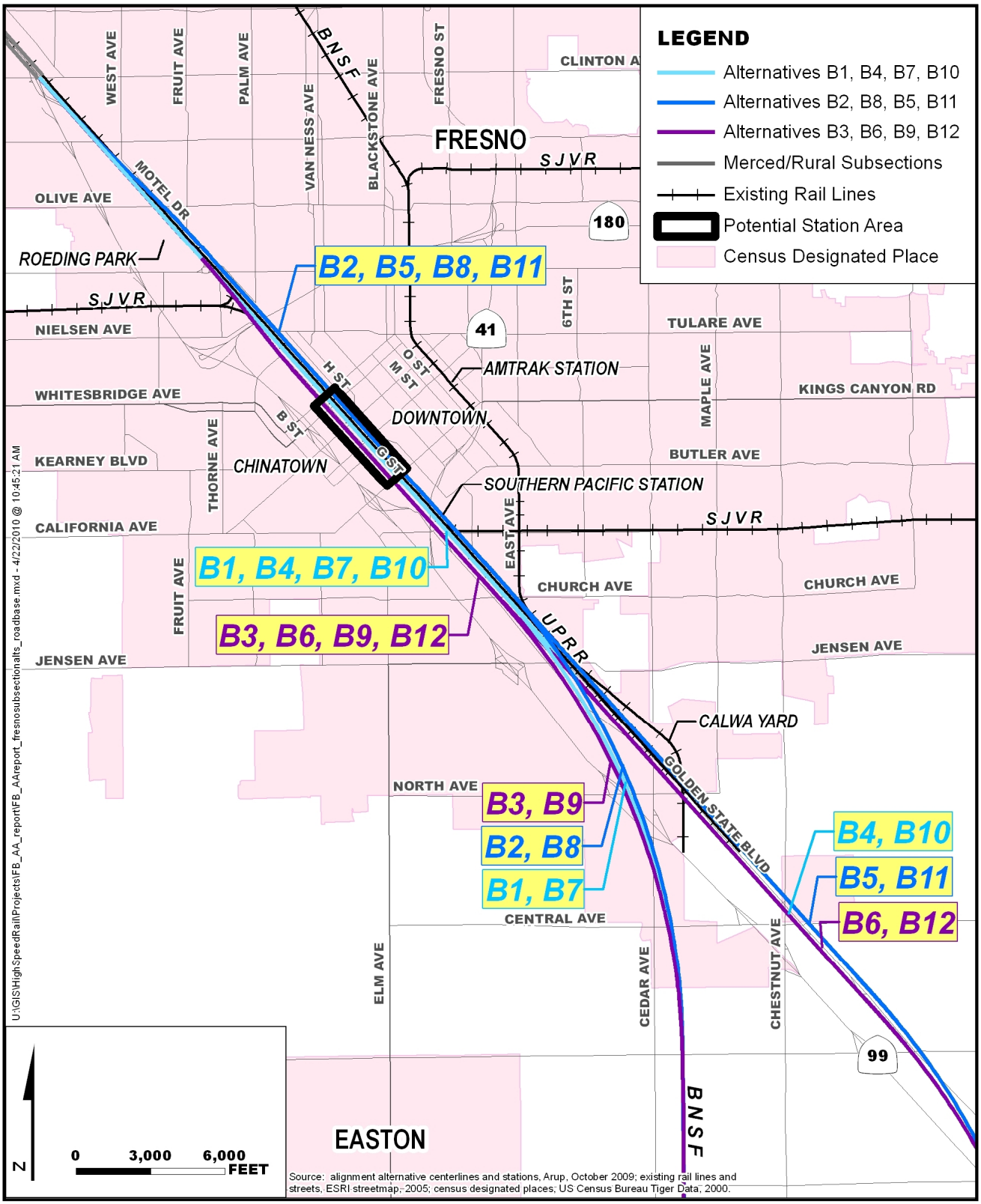


Figure ES-2. Rural Subsection — Alignment Alternatives Considered

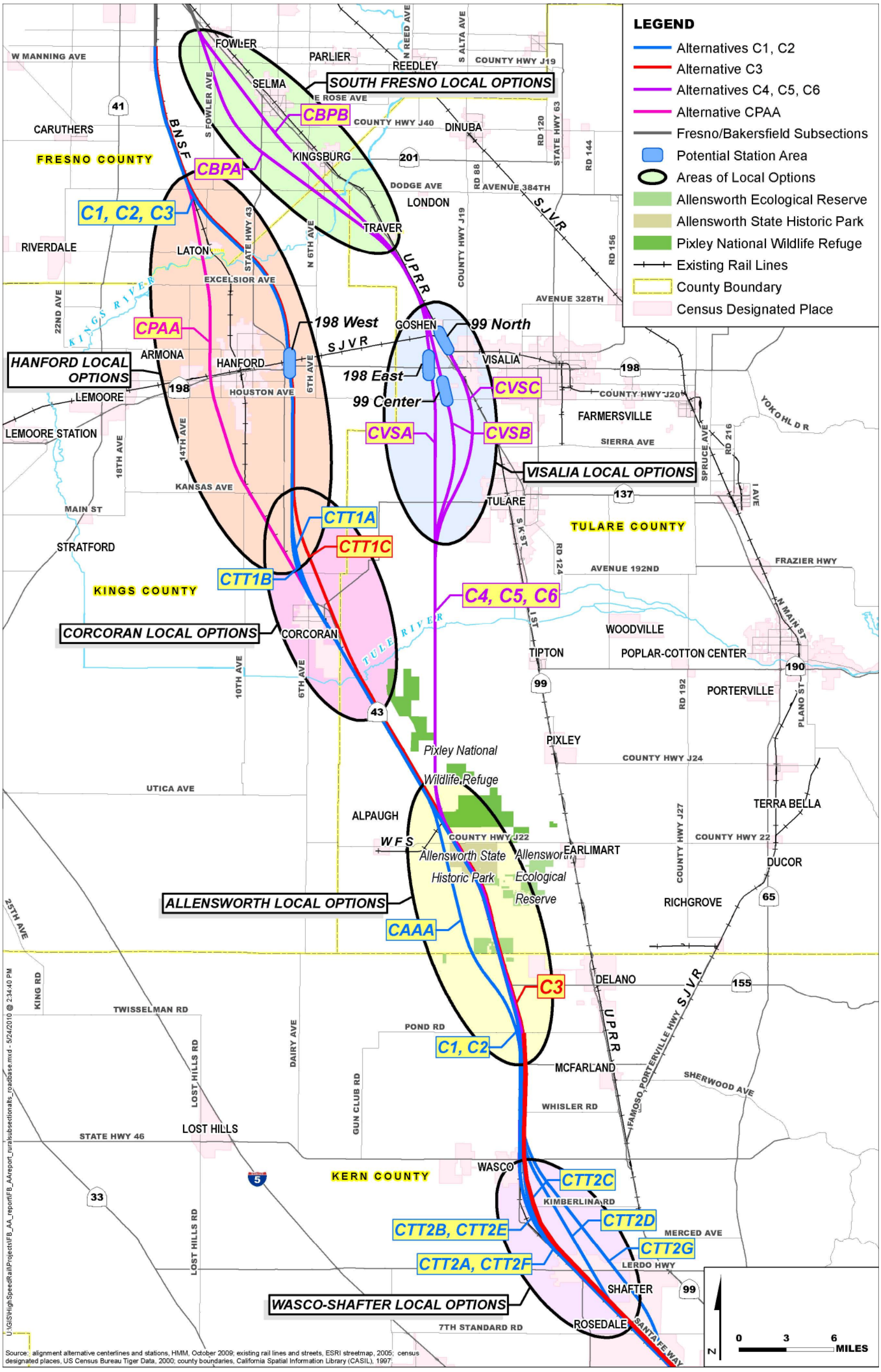


Figure ES-3. Bakersfield Subsection — Alignment Alternatives Considered

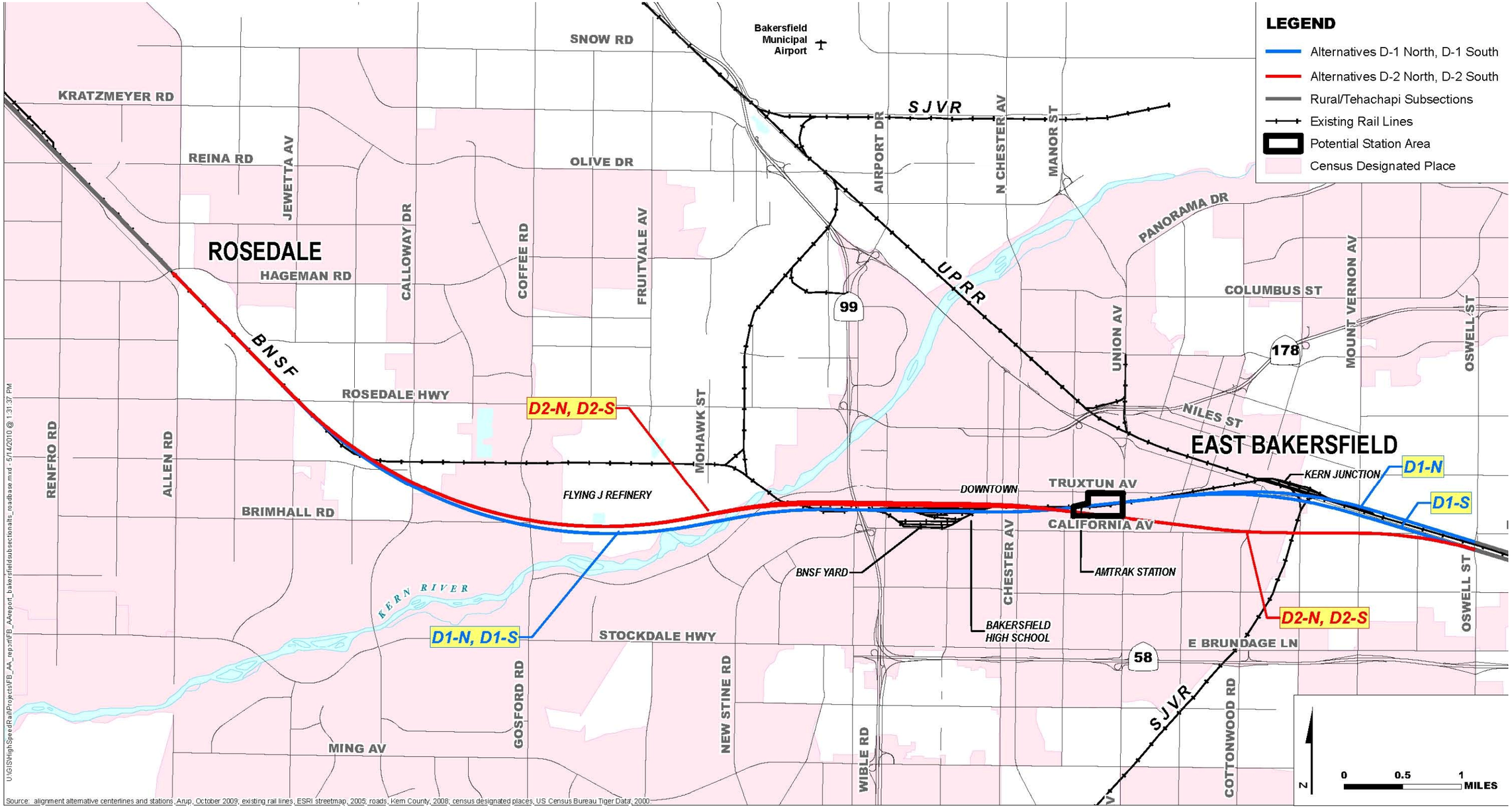


Figure ES-4. Alignment Alternatives and Heavy Maintenance Facility Sites Carried Forward for Evaluation in the Draft EIR/EIS

1.0 INTRODUCTION

The California High-Speed Rail Authority (the Authority) and the Federal Railroad Administration (FRA) are studying alternative alignments for a high-speed train (HST) section between Fresno to Bakersfield. This report incorporates conceptual engineering information and identifies potentially feasible and practicable alternatives to carry forward for environmental review and evaluation in the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) under the California Environmental Quality Act (CEQA) and the National Environmental Protection Act (NEPA) for the Fresno to Bakersfield Section of the California HST Project.

Additionally, the Authority and the Federal Railroad Administration (FRA) have entered into a memorandum of understanding (MOU) with the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) to integrate the NEPA process with the Clean Water Act (CWA) Section 404 process. The Section 404 (b)(1) process includes an alternatives analysis and, therefore, the objective is for the EPA and the USACE to reach concurrence with the Authority and the FRA on the alternatives to be carried forward into the EIR/EIS.

1.1. California HST Project Background

The California HST is planned to provide intercity, high-speed train service on more than 800 route miles throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The HST system is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, which will include contemporary safety, signaling, and automated train-control systems. The trains will be capable of operating at speeds of up to 220 miles per hour (mph) over a fully grade-separated, dedicated track alignment, with an expected express trip time between Los Angeles and San Francisco of approximately 2 hours and 40 minutes.

The California HST project will be planned and designed, and will be constructed and operated, under the direction of the Authority, a state governing board formed in 1996. The Authority's statutory mandate is to develop a high-speed rail system that is coordinated with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports.

1.2. Fresno to Bakersfield Section EIR/EIS Background

The Fresno to Bakersfield HST Section is a critical link connecting the Merced to Fresno HST section to the Bakersfield to Palmdale and Palmdale to Los Angeles HST sections. The HST network alternatives and HST alignment alternatives between Fresno to Bakersfield were analyzed in the 2005 Final Program EIR/EIS for the Proposed California HST System (referred to hereafter as the Statewide Program EIR/EIS). Consistent with the Authority's project objective to maximize the use of existing transportation corridors and rights-of-way, to the extent feasible, most of the alternatives considered for the Fresno to Bakersfield alignment followed the two existing freight corridors of the UPRR and the BNSF. By sharing the existing freight railroad right-of-way in these corridors, where possible, it was judged that HST impacts throughout the Central Valley could be further avoided and minimized.

The 2005 Statewide Program EIR/EIS resulted in selection of the existing BNSF Railway as the preferred alignment option for the Central Valley HST between Fresno and Bakersfield. The BNSF route was selected because it would have fewer constructability issues, would have fewer potential noise, cultural, community, and property impacts, and was estimated to cost between $590–800 million less the UPRR alignment options. The technical analysis conducted for the Program EIR/EIS concluded that the biological and water resources impacts associated with the BNSF and UPRR alignments did not differ

very much. The program-level analysis also concluded that there was no difference concerning kit fox habitat indicators between the two alignments.

The City and County of Fresno, Fresno COG, and the cities of Fowler, Selma, and Kingsburg opposed the UPRR alignment, citing concerns over the potential bisecting of the communities south of Fresno (HMM/Arup Joint Venture, 2007). On the other hand, the California Department of Parks and Recreation stated a preference for the UPRR alignment, noting potential visual, noise, and vibration impacts to the Colonel Allensworth State Historical Park (HMM/Arup Joint Venture, 2009). In response to these concerns, the Program EIR/EIS called for a comprehensive study of ways to avoid and/or minimize potential impacts to these sensitive areas and the historical park as part of project level environmental review.

Considerable public and agency comments were received during the Program EIR/EIS process supporting the UPRR alignment with a Visalia Airport station stop, including comments from the Tulare County Association of Governments and the cities of Visalia and Tulare. In response, the Authority committed to undertaking an additional study of an alignment option between Fresno and Bakersfield to serve a potential Visalia station prior to the commencement of project-level environmental review. This study took form as the Visalia-Tulare-Hanford Station Feasibility Study (August 2007).

Initially, the Fresno to Bakersfield and Merced to Fresno sections were combined into a single project section known as the Merced to Bakersfield Section. The Notice of Intent / Notice of Preparation (NOI/NOP) for the combined Merced to Bakersfield Section EIR/EIS was published in the Federal Register in March 2009. Scoping activities were conducted between February 24 and April 10, 2009, with scoping meetings held in Merced, Madera, Visalia, Fresno, and Bakersfield. The meetings provided information about the history of the HST project to date, the program EIR/EIS preferred alternatives, and the upcoming steps in the environmental process, including alternatives development and analysis. The meetings are summarized in the Merced to Bakersfield Section Scoping Report (June 2009).

Subsequently, the Merced to Bakersfield Section was divided into two separate project sections, Merced to Fresno and Fresno to Bakersfield. The Authority and FRA determined that the environmental effects of the HST System in that section would be more appropriately assessed in two separate documents: one for Merced to Fresno and another for Fresno to Bakersfield. The project sections have sufficient length and logical termini to ensure that the projects could function effectively without requiring additional improvements elsewhere and without restricting consideration of alternatives for other sections of the HST system or transportation improvements.

An amended NOP for the Fresno to Bakersfield section was distributed in September 2009, and an NOI was published in October 2009 soliciting additional comments. The results of the scoping meetings and the comments received afterward, along with comments received at subsequent public outreach meetings with landowners, water districts, community representatives, are summarized in the *Fresno to Bakersfield Section, Scoping Report.* A summary of comments received for Fresno to Bakersfield Section is provided in Appendix C.

Alternatives for the Fresno to Bakersfield section were defined in an iterative process using information gathered from program-level work, the scoping process, Technical Working Group (TWG) meetings, and prior HST planning studies (including the Visalia–Tulare–Hanford Station Feasibility Study), Public Information Meetings (PIMs) and other outreach meetings. The process used to define, evaluate, and select alternatives for further study is detailed in Section 3.0. Alternatives that have been identified for detailed environmental review are described in Section 4.0.

1.3. Study Area

The Fresno to Bakersfield HST project section is approximately 120 miles long, extending from approximately three miles north of the Fresno station to three miles southeast of the Bakersfield station in order to fully consider alignment alternatives in those areas. In both cases, the limits correspond to points where multiple options are reduced to a single alignment for a short distance. The Fresno to Bakersfield section connects with the Merced to Fresno Section to the north, and to the Bakersfield to Palmdale Section in the south. The HST sections would connect with a continuous high-speed rail line.

To facilitate the alternatives analysis process, this section has been divided into three subsections (see Figure 1-1):

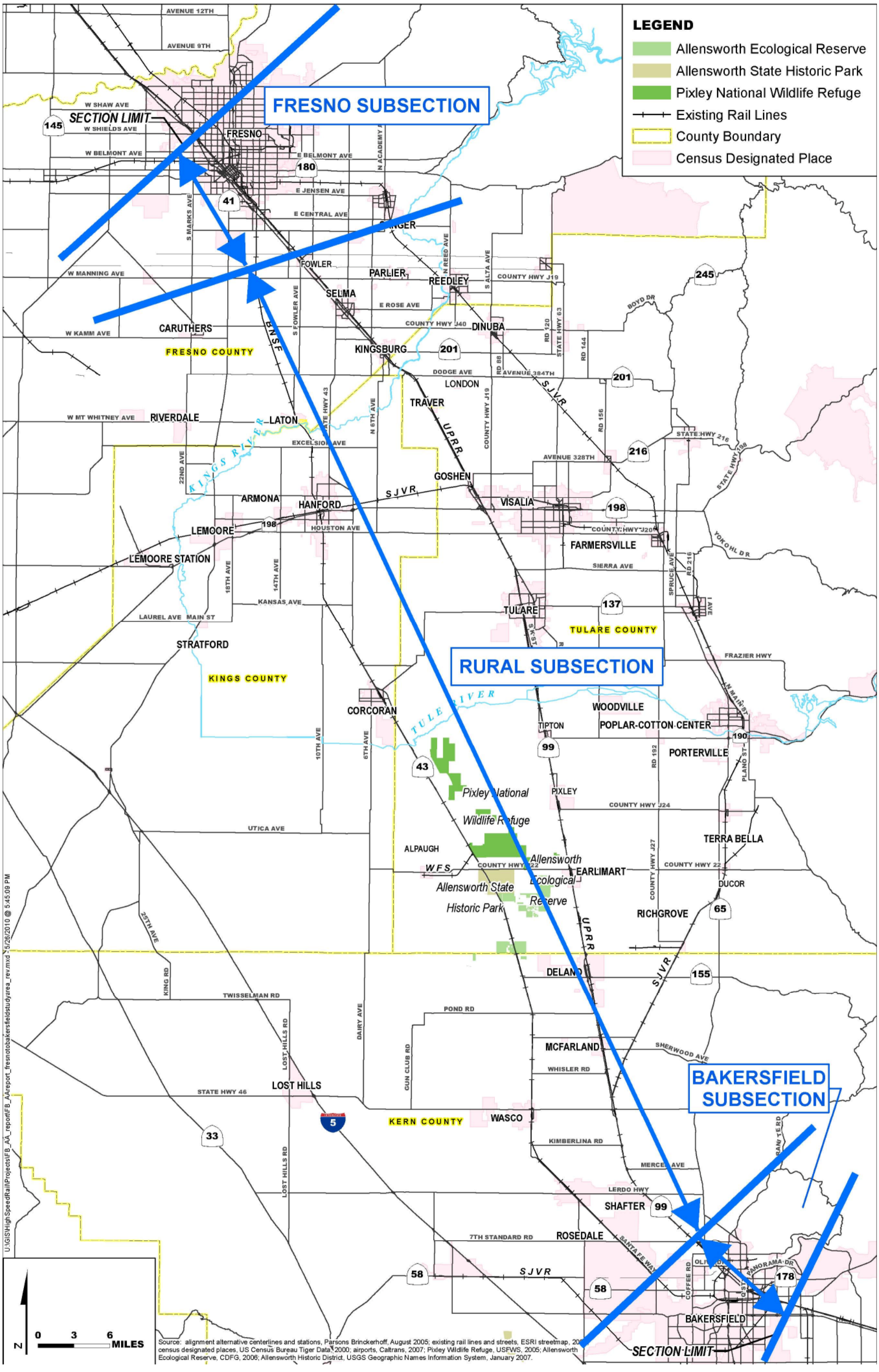
- **Fresno Subsection** – Extends from Clinton Avenue on the north (approximately three miles north of downtown Fresno) to E. Manning Avenue in both the BNSF and UPRR corridors on the south, about 10 miles south/southeast of downtown Fresno. This subsection consists mainly of industrial, suburban residential, and commercial land uses in the urban area and agricultural uses in the rural area south of Fresno.
- **Rural Subsection** – Extends from E. Manning Avenue on the north and continues to Hageman Road in the community of Rosedale northwest of downtown Bakersfield on the south. The majority of this subsection is either active agriculture or open space, with four small communities interspersed: Hanford, Corcoran, Wasco, and Shafter.
- **Bakersfield Subsection** – Extends from Hageman Road on the north, through downtown Bakersfield, to Oswell Street to the southeast. This subsection is primarily urban, and includes residential, commercial, light and heavy industrial, and some open space land uses.

1.4. Purpose of Study

Following the *Alternatives Analysis Methods for Project EIR/EIS* , Version 2 (October 2009, provided in Appendix A), the Fresno to Bakersfield Alternatives Analysis considers preliminary planning, environmental, and engineering information in order to identify potentially feasible and practicable alternatives to carry forward for environmental review in the Fresno to Bakersfield HST Project EIR/EIS. The alternatives analysis is intended to identify a range of potentially feasible alternatives for further analysis and consideration.

This report documents the alternatives developed for consideration; the methodology and evaluation criteria (measures) to determine which alternatives to recommend for detailed environmental analysis; the results of the evaluation of those alternatives; and a discussion of those alternatives recommended to be carried forward for further environmental analysis, and those that are not.

Figure 1-1. Fresno to Bakersfield Section Study Area



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2.0 ALTERNATIVES DEVELOPMENT PROCESS

The Alternatives Analysis process involved the creation, comparison, and refinement of alternatives through a series of increasingly detailed steps. The methodology presented in this section follows guidance described in the *Technical Memorandum Alternatives Analysis for Project EIR/EIS* (October 2009) (see Appendix A) and uses both qualitative and quantitative evaluation measures that reflect a range of policy and technical objectives.

The following activities and methods were used to gather information necessary define and evaluate alternatives:

- **Field Inspections of Corridors** – Planners, engineers, and analysts with experience in rail construction and operations conducted field inspections of potential rights-of-way and station locations to identify conditions and factors potentially not visible in aerial photos or on maps. Over the course of the study, field inspections became progressively more detailed as the alternatives were refined.
- **Project Team Input and Review** – The project team conducted team meetings to discuss alternatives and issues that could potentially affect alignment alternatives.
- **Qualitative Assessment** – Alternative alignments were assessed using qualitative measures developed by project team members with experience in construction and operation of high-speed rail and other transportation systems. These measures included constructability, accessibility, operability, maintainability, right-of-way, public infrastructure impacts, railway infrastructure impacts, and environmental impacts.
- **Engineering Assessment** – Engineering assessments were provided for measures that could be readily quantified at this stage of project development. These assessments provided information on project length, travel time, and configuration of key features of alignment corridors such as the presence of existing infrastructure, the amount of agricultural land an alternative would impact, etc.
- **Geographic Information System (GIS) Analysis** – Much of the assessment was performed using GIS data, which enabled depictions of the project's interactions with a variety of measurable geographic features, both natural and built. GIS data were used to assess impacts on farmland, water resources, wetlands, threatened and endangered species, cultural resources, current urban development, and infrastructure. (GIS data source references can be found in Appendix B.)

Based on these information-gathering activities, evaluation criteria (measures) and methods were applied to determine the extent to which each alternative could achieve the project purpose and need and objectives, including avoidance and minimization of environmental impact. Sections 2.1 through 2.4, below, describe the criteria and methods used to evaluate the alternatives in more detail.

2.1. HST Project Purpose

The purpose of the California HST Project is to implement the statewide HST System in sections along the corridors selected in program-level (Tier 1) decisions that will that will: (1) link Southern California cities, the Central Valley, Sacramento, and Bay Area; (2) provide a new transportation option that increases mobility throughout California; (3) provide reliable HST service that delivers predictable and consistent travel times using electric powered wheel trains; and (4) provide a transportation system that is commercially viable.

2.1.1. Objectives of the Statewide HST

The Authority's statutory mandate is to plan, build, and operate a HST system that is coordinated with California's existing transportation network, particularly intercity rail and bus lines, commuter rail lines, urban rail transit lines, highways, and airports.

The Authority's objective is to provide reliable high-speed electric powered train service that delivers predictable and consistent travel times. The Fresno to Bakersfield Section of the HST System will provide greater access and choice of transportation modes, which will increase mobility throughout the region and contribute to the increased mobility throughout California.

This section of the HST System will connect the San Francisco Bay Area and Sacramento region to the north with the Los Angeles and San Diego metropolitan areas in the south. Design practices will minimize and avoid environmental impacts to stream crossings that can serve as habitat for listed wildlife species such as the California red-legged frog. Potential impacts to neighborhoods, communities, and agricultural operations along the Fresno to Bakersfield Section will be reduced by using the existing BNSF transportation corridor and right-of-way as much as possible to minimize right-of-way acquisitions, project design effects, and effects on community resources.

The Authority's objectives and policies for the proposed HST system are:

- Provide intercity travel capacity to supplement critically over-used interstate highways and commercial airports.
- Meet future intercity travel demand that will be unmet by present transportation systems and increase capacity for intercity mobility.
- Maximize intermodal transportation opportunities for location stations to connect with local transit, airports, and highways.
- Improve the intercity travel experience for Californians by providing comfortable, frequent, reliable, and safe high-speed travel. Safety includes not only reduced congestion along roadways, but safe travel in the wintertime fog that can pervade the Central Valley.
- Provide a sustainable reduction in travel time between major urban centers.
- Increase the efficiency of the intercity transportation system, and in doing so, reduce greenhouse gas emissions within the Central Valley.
- Maximize the use of existing transportation corridors and rights-of-way, to the extent feasible.
- Develop a practical and economically viable transportation system that can be implemented in phases by 2020 and generate revenues in excess of operations and maintenance costs.

2.2. Criteria Used to Identify Alternatives to be Carried Forward into Project EIR/EIS Analysis

The intent of the alternatives analysis is to consider a wide range of options and to identify those alternatives to be carried forward into in the Draft Fresno to Bakersfield Project EIR/EIS. Alternatives qualifying for detailed environmental analysis would exhibit:

- Alternative meets purpose and need and the project objectives in providing a sustainable reduction in travel time between major urban centers.
- Alternative has no environmental or engineering issues that would make approvals infeasible.
- Alternative is feasible and practical to construct.
- Alternative reduces or avoids adverse environmental impacts.

2.3. HST Design Objectives

To determine each alternative's ability to meet HST project purpose and need, alternatives are evaluated using HST system performance criteria that capture design differences and qualities in the alignment and station locations. These objectives and measures are summarized in Table 2-1, below.

Table 2-1. Alignment and Station Performance Objectives and Criteria

Objective	Criteria
Maximize ridership/revenue potential	Travel Time (Minutes)[1]
	Route Length (miles)
Maximize connectivity and accessibility	Intermodal connections
Minimize operating and capital costs	Capital costs
	Operating costs
	Maintenance costs

[1]The critical travel times within the Fresno to Bakersfield Section are the travel times for the alternatives within the three subsections defined for this analysis. These travel times are tied to the Proposition 1A requirement that HST travel between San Francisco and Los Angeles in 2 hours 40 minutes.

2.4. Comparison of Project Alternatives

In addition to the HST Project objectives and criteria presented in Sections 2.1 through 2.3, five additional types of measures are used to evaluate and compare project alternatives:

1. **Land Use** – Measures include: supports transit use, is consistent with existing adopted local, regional, and state plans, and is supported by existing and future growth areas (Table 2-2).
2. **Constructability** – Construction of the alternative is feasible in terms of constructability and right-of-way constraints (Table 2-3).
3. **Community Impacts** – Measures of disruption to neighborhoods and communities, including extent to which an alternative minimizes right-of-way acquisitions, minimizes dividing an established community, and minimizes conflicts with community resources (Table 2-4).
4. **Environmental Resources** – Extent to which an alternative minimizes impacts on environmental resources, including agricultural land and operations (Table 2-5).

Table 2-2. Land Use Evaluation Measures

Land Use		
Measurement	**Method**	**Source**
Development potential for Transit-Oriented Development (TOD) within walking distance of station	Identify existing and proposed land uses within 1/2-mile of station locations. Identify if there are TOD districts, a TOD overlay zones, mixed use designations, or if local jurisdictions have identified station areas for redevelopment or economic development.	Regional and local planning documents and land use analysis and input from local planning agencies.
Consistency with other planning efforts and adopted plans	Qualitative – General analysis of applicable planning and policy documents.	Land use analysis baseline conditions study.

Table 2-3. Constructability Evaluation Measures

Constructability and Right-of-Way		
Measurement	**Method**	**Source**
Constructability, access for construction, within existing transportation ROW	Extent of feasible access to alignment for construction.	Conceptual design plans and maps.
Disruption to existing railroads	Right-of-way constraints and impacts on existing railroads.	Conceptual design plans and maps.
Disruption to and relocation of utilities	Number of utility diversions.	Conceptual design plans and maps.

Table 2-4. Community Evaluation Measures

Avoided or Minimized Disruption to Neighborhoods and Communities		
Measurement	**Method**	**Source**
Displacements	Number and acres of parcels by land use type within alignment and station footprint by type of use: agricultural, residential, commercial, and industrial.	Identified comparing the alignment conceptual design drawings with aerial photographs, zoning maps, and General Plan/land use maps.
Properties with access affected	Identify potential locations along the alignments or at stations where access would be affected.	Estimated from conceptual design plans and aerial photographs.
Local traffic effects around stations	Identify potential locations where increases in traffic congestion or erosion of level of service (LOS) are expected to occur.	Existing traffic LOS from local jurisdictions.
Local traffic effects of grade separations	Identify potential locations of at-grade separations where increase in traffic congestion or LOS are expected to occur.	Existing traffic LOS from local jurisdictions.

Table 2-5. Environmental Resources Evaluation Measures

Avoided or Minimized Impact on Environmental Resources		
Measurement	**Method**	**Source**
Waterways, wetlands, natural preserves, or biologically sensitive habitat areas affected	Identify new bridge crossings required; estimate of acres of wetlands, linear feet of waterways; acres and species of T&E habitat affected; acres of natural areas/critical habitat affected.	Estimated from conceptual design plans and GIS layers.
Cultural resources	Identify locations of properties listed in the National Register of Historic Places or California Historical Resources Information System. For archaeological resources identify areas of high or moderate sensitivity based on previous studies conducted in the study area.	Based on conceptual design plans, GIS layers, Section 4(f) studies, and cultural resource records searches and surveys.
Parklands	Number and acres of parks that could be directly and indirectly affected. This would also include major trails that would be crossed.	Based on conceptual design plans, GIS layers, and Section 4(f) studies.
Agricultural land and operations	Acres of prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance within preliminary limits of disturbance. Effects on other essential agricultural operations (e.g., dairies).	Based on conceptual design plans and GIS layers.
Noise and vibration effects on sensitive receivers	Identify types of land use activities that would be affected by HST pass-by noise and ground vibration.	Results of screening-level assessment: inventory of potential receivers from site survey and aerial maps
Change in visual/scenic resources	Identify number of local and scenic corridors crossed and scenic/visual resources affected by HST elevated structures in scenic areas and shadows on sensitive resources (parks). Identify locations where residential development is in close proximity to elevated HST structures.	Results of general assessment
Maximize avoidance of areas with geological and soils constraints	Identify number of crossings of known seismic faults.	U.S. Geological Survey (USGS) maps and available GIS data
	Acres of encroachment into areas with highly erodible soils.	
	Acres of encroachment into areas with high landslide susceptibility.	
Maximize avoidance of areas with potential hazardous materials	Hazardous materials/waste constraints (number and types of sites).	Data from previous records search conducted for other projects within study area

3.0 PROJECT ALTERNATIVES

This section first describes the No Project Alternative established to address state and federal environmental requirements and then explains the outcomes of the Statewide Program EIR/EIS, which provided the basis for the initiation of the AA process. It then outlines the two-step process used to define and review an initial set of alternatives. Finally, it describes the alternatives that were carried forward for detailed analysis in Section 4.0 of this report based on this review.

3.1. No Project Alternative

The No Project Alternative is the reasonably foreseeable future condition absent the HST system. The No Project Alternative (Figure 3-1) represents the state's transportation system (highways, air, and conventional rail) as it is currently and as it would be after implementation of programs or projects that are currently identified in regional transportation plans (RTPs), have identified funds for implementation, and are expected to be in place by 2035, the environmental study's horizon year. The level of infrastructure improvement (based on expected federal, state, regional, and local funding) was analyzed in consideration of the growth in population and transportation demand projected to occur by 2035. The future improvements that would be part of the No Project Alternative are also included under the HST "Build" Alternatives as part of the future 2035 baseline.

The No Project Alternative satisfies the statutory requirements under CEQA and NEPA for an alternative that does not include any new action or project beyond what is already committed. It is based on the following sources of information:

- State Transportation Improvement Program (STIP)
- Regional Transportation Plans (RTPs)
- State of California Office of Planning and Research CEQAnet Database
- Airport Master Plans
- City and county general plans and interviews with planning officials
- Intercity passenger rail plans

The No Project Alternative is described more fully in Appendix D.

3.2. Program Alternatives

3.2.1. 2005 Statewide Program EIR/EIS

A. Statewide Program Alternatives

The Statewide Program EIR/EIS for the HST system was completed in November 2005. The Authority and FRA selected the technology for the HST vehicles and identified potential route and station options through the program environmental analysis. The Statewide Program EIR/EIS examined three major alternatives for the statewide transportation network. They were as follows:

- No Project Alternative – The state's transportation network as it is today, along with funded projects included in regional transportation plans.
- Modal Alternative – Enhancements to the state's transportation network using existing modes and technologies (mainly expanded airports and highways).
- High-Speed Train Alternative – A new high-speed train system to connect California's major urban centers.

The HST Alternative was the selected system alternative in the Statewide Program EIR/EIS. The No Project Alternative was not able to provide the needed level of intercity mobility in the future, and the Modal Alternative provided reduced mobility compared to the HST Alternative. Furthermore, the Modal Alternative would have a higher cost than the HST Alternative, and larger environmental impacts.

B. Fresno to Bakersfield Section Routing and Station Alternatives

The Statewide Program EIR/EIS evaluated a corridor extending through the Central Valley from Sacramento to Bakersfield. In technical studies conducted during the Statewide Program EIR/EIS, five general alternatives were considered. They were:

- BNSF route, generally paralleling the BNSF right-of-way
- UPRR route, generally paralleling the UPRR right-of-way
- I-5 route
- West 99 route, 2–4 miles west of SR-99 and generally paralleling the UPRR/SR-99 corridor.
- East 99 route, located 10–15 miles east of and generally paralleling the UPRR/SR-99 corridor.

The I-5, West 99, and East 99 routes were eliminated from study in the Program EIR/EIS early on in the alternatives screening process for the following reasons.

Studies found that, while the I-5 route could provide better end-to-end travel times than the SR-99 corridor, it would result in lower ridership and would not meet the current and future intercity travel demand of Central Valley communities as well as the SR-99 corridor. In addition, the I-5 route would not provide transit and airport connections in this area. It thus failed to meet the purpose and need and basic objectives of maximizing intermodal transportation opportunities and improving the intercity travel experience in the Central Valley area of California as well as the SR-99 corridor (CHSRA/FRA, 2005).

The West of 99 and East of 99 alternatives were both considered "greenfield" alternatives, passing largely through farmland. Both alternatives were eliminated because of their potential impacts to agricultural land and their inconsistency with the objective of following existing transportation corridors as a method of minimizing environmental impacts..

The BNSF and UPRR routes through the Central Valley corridor were carried through to the full Statewide Program EIR/EIS. Two segments were defined within the Fresno to Bakersfield Section: Fresno to Tulare and Tulare to Bakersfield. The following alignment alternatives and station locations were evaluated within these segments:

- Alignment Alternatives
  - BNSF Only (Fresno-Tulare and Tulare-Bakersfield segments)
  - UPRR Only (Fresno-Tulare and Tulare-Bakersfield segments)
  - UPRR/BNSF (Tulare-Bakersfield segment only)
  - BNSF/UPRR (Tulare-Bakersfield segment only)

- Station Locations
  - Fresno Downtown
  - Visalia Airport
  - Hanford
  - Truxtun (Bakersfield)
  - Golden State (Bakersfield)
  - Bakersfield Airport

Table 3-1 lists each of the alternatives and station locations considered in the Statewide Program EIR/EIS and whether or not they were carried forward for further study. The BNSF Route and the Downtown Fresno Station were identified as the preferred alternative and station location.

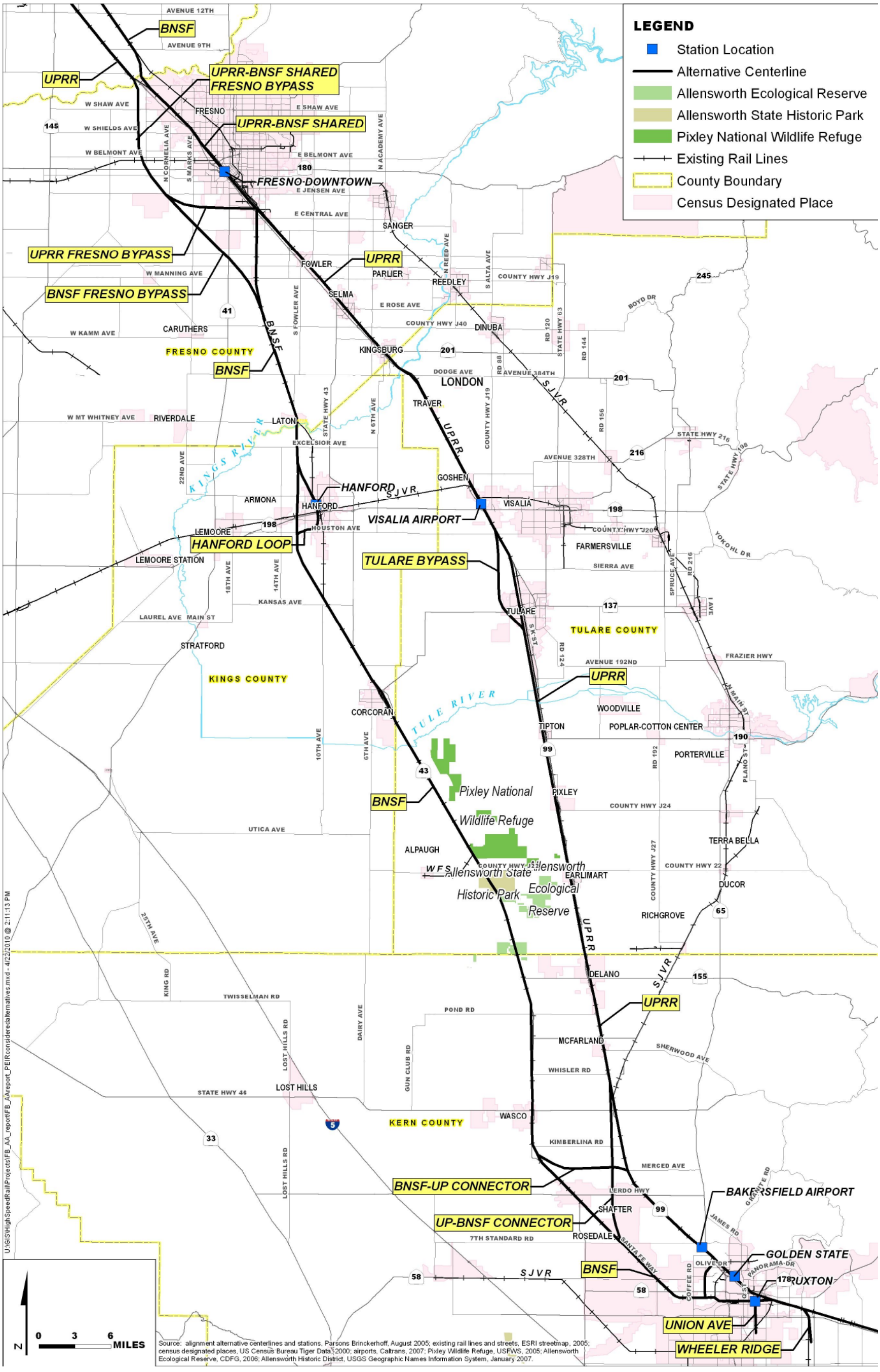
Figure 3-1 illustrates the Fresno to Bakersfield alignments evaluated in the Program FEIR/EIS.

The Statewide Program EIR/EIS preferred alignment generally parallels the BSNF between Fresno and Bakersfield and the UPPR through the urban area of Fresno. This alignment was selected because it would have fewer constructability issues, would have fewer potential noise, cultural, community, and property impacts, and was estimated to cost between $590-800 million less the UPRR alignment options. The technical analysis conducted for the Program EIR/EIS concluded that the biological and water resources impacts associated with the BNSF and UPRR alignments were not appreciably different. The program-level analysis also concluded that there was no difference concerning kit fox habitat indicators between the two alignments. The Statewide Program EIR/EIS preferred alignment for the Fresno to Bakersfield Section is described in more detail in Section 3.3, which describes alternatives by subsection (Fresno, Rural, Bakersfield).

Table 3-1. Alternatives Considered in 2005 Statewide Program EIR/EIS

Alternatives / Stations	Program EIR/EIS Decision		Notes
	Carried Forward	Not Carried Forward	
BNSF Route	South of Fresno: Preferred in 2005 EIS/EIR		BNSF is assumed to converge with UPRR north of Fresno and through central Fresno before continuing on historic alignment south of Fresno.
UPRR Route	Through central Fresno: Preferred in 2005 EIS/EIR (see note under BNSF Route above)		Program EIR/EIS called for additional study of alignment option(s) to serve potential Visalia station prior to commencement of project-level environmental review.
Station Location: Fresno Downtown	Preferred in 2005 EIS/EIR		
Station Location: Visalia Airport			Program EIR/EIS called for additional study of alignment option(s) to serve potential Visalia station prior to commencement of project-level environmental review. (Visalia-Tulare-Hanford Station Feasibility Study)
Station Location: Hanford		Eliminated during the evaluation of alternatives process	The Visalia-Tulare-Hanford Station Feasibility Study introduced a potential station east of Hanford as part of its evaluation of alignment options that would serve a station in the general area.
Station Location: Truxtun (Bakersfield)	Preferred in 2005 EIS/EIR		
Station Location: Golden State (Bakersfield)		Eliminated during the evaluation of alternatives process	
Station Location: Bakersfield Airport		Eliminated during the evaluation of alternatives process	
EIR/EIS = Environmental Impact Report/Environmental Impact Statement			

Figure 3-1. Fresno to Bakersfield Section – Alignments Evaluated in Statewide Program EIR/EIS



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3.3. Initial Development of Project Alternatives

For each subsection within the Fresno to Bakersfield Section (Fresno, Rural, and Bakersfield), the Authority conducted agency and community outreach to help identify a broad range of alternatives for further development as part of the project-level environmental process. An initial evaluation of alternatives was conducted, which narrowed down the range of alternatives to be evaluated in detail. The initial evaluation resulted in 12 alignment alternatives in the Fresno Subsection, 6 alignment alternatives and about 14 local options in the Rural Subsection, and 2 alignment alternatives in Bakersfield, each with two variations.

3.3.1. Fresno Subsection

The Fresno Subsection begins at the end of the Merced to Fresno Section at Clinton Avenue in Fresno, approximately three miles north of the Fresno station location. The Fresno Subsection ends near E. Manning Avenue in Fresno, where to meets the Rural Subsection.

The evaluation of alternatives for the Merced to Fresno Section (north of Clinton Avenue) are described in the *Preliminary Alternatives Analysis Report for the Merced to Fresno Section.*

A. Initial Review of Alternatives

Alternatives were developed, refined, and evaluated in an iterative process. The development and evaluation of initial alternatives is documented in the *Final Initial Screening Memorandum – Fresno Area* (Appendix E-1 of this report). This section describes the initial alternatives developed with input from the community and the TWG. It then explains the selection of which alternatives to carry forward for further analysis and describes the project alternatives to be analyzed in Section 4.0 of this report.

Description of Initial Alternatives

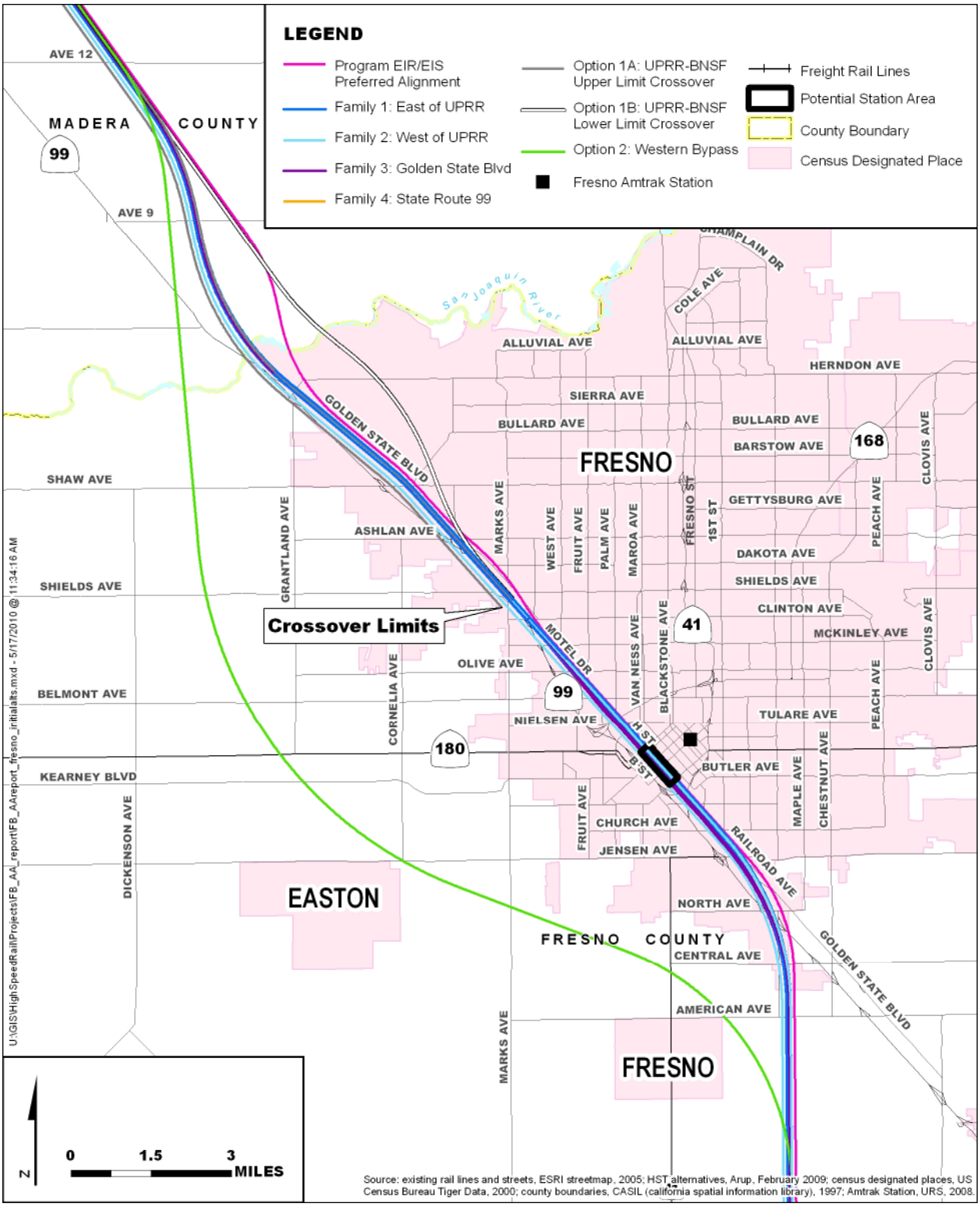
The initial alternatives developed for further consideration were all based on the Statewide Program EIR/EIS Preferred Alignment in that they parallel the UPRR rail alignment through central Fresno. These alternatives reflected greater detail as to their orientations to other rights-of-way, fixed features, and planned development than in the Statewide Program EIR/EIS. Of these general alternatives, two were based on the assumption of greatest possible proximity to the UPRR alignment and two were aligned with other linear facilities parallel to UPRR through central Fresno. Alternatives 1, 2, and 3 were defined as "families," each encompassing a range of at-grade, below-grade, above-grade, and stacked design solutions corresponding with a single horizontal alignment.

With input from the Fresno Technical Working Group (TWG) and other local stakeholders, four families of initial alternatives and associated options were generated for the HST alignment through Fresno. These alternatives and options are summarized below and shown in Figure 3-2**.** A more detailed treatment can be found in the *Final Initial Screening Memorandum – Fresno Area* (Appendix E-1).

Program EIR/EIS Preferred Alternative

The Statewide Program EIR/EIS identified the BNSF rail alignment as the preferred option between Merced and Fresno, with the assumption that the alignment would cross over to parallel the UPRR rail alignment just south of Herndon Avenue in Fresno. Through central Fresno, within the Fresno Subsection, the Preferred Alignment parallels and is adjacent to the UPRR rail alignment. South of Fresno, the Preferred Alignment transitions back from the UPRR right-of-way to the BNSF right-of-way between American and Jensen avenues prior to connecting with the Rural Subsection.

Figure 3-2. Fresno Subsection – Initial Alternatives Considered



Alternative Family 1 – HST East of UPRR Right-of-Way

This family of alternatives represents a variety of conditions that would exist if the HST system were built immediately adjacent to the eastern side of existing UPRR right-of-way through central Fresno. This family encompasses five alternatives, differentiated by vertical profile through Fresno or by the vertical arrangement of station tracks:

- Alternative 1-1 – Elevated
- Alternative 1-2 – At-grade
- Alternative 1-3 – Below-grade
- Alternative 1-4 – Through tracks elevated, station tracks at-grade
- Alternative 1-5 – Through tracks below-grade, station tracks at-grade.

The following characteristics apply to this family of alternatives:

- UPRR occupies a north-south right-of-way no less than 100 feet wide through central Fresno.
- The HST alignment would be built immediately adjacent to the eastern side of UPRR right-of-way limits, with no spacing between the HST right-of-way and the UPRR right-of-way.
- Alternative 1-3, by definition, would tunnel from north of the UPRR Fresno Yard to south of downtown Fresno.
- A downtown Fresno HST station would be located between Stanislaus and Ventura streets and SR-99 and H Street.
- A downtown Fresno station HST station location could serve Amtrak as well as high-speed trains if Amtrak operations were re-routed to the adjacent UPRR corridor.
- Alternatives 1-4 and 1-5 would incorporate "stacked" cross-sections, with the station tracks at-grade (110 mph) and the through tracks (220 mph) either directly above or below them, to narrow the HST right-of-way.

Key features in the immediate vicinity of this alternative family include:

- Historic Southern Pacific Depot
- Chukchansi Park (Baseball Stadium)
- Fulton Mall
- BNSF Calwa Yard

Alternative Family 2 – HST West of UPRR Right-of-Way

This family of alternatives is identical to Family 1, albeit with the HST guideway adjacent to the western side of the existing UPRR right-of-way through central Fresno.

Alternative Family 3 – Golden State Boulevard

This family consists of two alternatives following the current alignment of Golden State Boulevard, one elevated and one below-grade. From north to south, the HST alignment would enter the Fresno Subsection via the Golden State Boulevard right-of-way. It would then proceed south past the eastern edge of Roeding Park and through Chinatown, either below-grade via a tunnel or on an elevated structure. The alignment would continue south and depart the Golden State Boulevard right-of-way at about Church Avenue and proceed south adjacent to the BNSF rail alignment in the vicinity of Cedar Avenue.

Alternative 4 – State Route 99

From north to south through the Fresno Subsection, this alternative would follow the alignment of SR-99 until where SR-99 swings west to bypass Roeding Park. It would then stay elevated along the western edge of Roeding Park, maintaining its 220 mph operating speed, before proceeding south in the SR-99 right-of-way on an elevated structure through central Fresno. Before leaving the Fresno Subsection, it would transition to the BNSF rail alignment in the vicinity of Cedar Avenue.

Western Bypass Option (OP 2)

Bypasses of Fresno had been eliminated from consideration in the Program EIR/EIS in response to concerns about farmland impacts and capital costs. A western bypass option was, however, introduced during the AA process for two reasons. First, in response to discussions that originated from the Fresno Freight Rail Realignment Study, the City and County of Fresno and the Council of Fresno County Governments encouraged the Authority to evaluate the concept of separating express and local HST tracks through the Fresno area. Second, the Merced to Fresno Section had been considering a Western Madera alternative (D08) that would have aligned with the western edge of the Fresno metropolitan area.

The Western Bypass Option would have routed two HST tracks around Fresno via a bypass to accommodate through (express) trains. This would, in turn, have enabled a narrower, lower-speed, and more flexible HST right-of-way for station tracks to be aligned through central Fresno adjacent to the UPRR right-of-way. This concept could also have been coupled with realignment of the UPRR and/or BNSF tracks to create additional flexibility for management of freight and passenger service through the Fresno area.

Evaluation of Initial Alternatives

The alternatives were subjected to an initial review to determine if they met the project purpose and need, resulted in impacts on community resources, conflicted with approved future development in the study area, or deviated from desired design performance criteria as defined in the Alternatives Analysis Methods for Project EIR/EIS Technical Memorandum Version 2 (October 2009). They were then evaluated for their ability to maximize design standards, minimize disruption to neighborhoods and communities, and minimize impacts on environmental resources.

Each alternative assumes a downtown station in the area generally bounded by Stanislaus Street on the north, Ventura Street on the south, H Street on the east, and SR-99 on the west. Because all of the alignment alternatives provided the opportunity for a long stretch of tangent track through this area, they afforded considerable flexibility for the location station platforms. Thus, station location was not considered a distinguishing factor in evaluating the alignment alternatives since the basic locations could be matched under all of the alternatives.

Table 3-2 summarizes the alternatives considered in the initial review, highlighting the key aspects of the evaluation and showing the outcomes of the evaluation in terms of which alternatives were carried forward into the full alternatives analysis and which were eliminated from consideration. This information is detailed in the *Final Initial Screening Memorandum – Fresno Area* (August 2009) (Appendix E-1 to this report).

B. Detailed Description of Alternatives Carried Forward for Alternatives Analysis

Based upon the initial alternatives evaluation results the Authority and FRA carried forward the following alternatives/options for further study:

- Alternatives 1-1 and 1-2 – HST East of UPRR Right-of-Way
- Alternatives 2-1 and 2-2 – HST West of UPRR Right-of-Way
- Alternative 3-1 – Golden State Boulevard

Through central Fresno, all of these alternatives generally parallel the UPRR right-of-way, which is straight and 100 feet wide. The alternatives can be classified as UPRR West, UPRR East, or Golden State Boulevard, and each includes alternatives that follow either the BNSF or the UPRR rights-of-way to the south of central Fresno. These variations result in a total of 12 discrete alternatives for this Subsection (Alternatives B1 through 12).

Table 3-2. Fresno Subsection Initial Alternatives Retained and Removed

Family/Option	Variations	Evaluation	Carried Forward	Not Carried Forward
Program EIR/EIS Preferred Alignment	N/A	▪ Reflected in refined forms under Alternative Families 1 and 2.	See Alt Families 1 and 2.	
Alternative Family 1 East of UPRR	Alt 1-1: Elevated Alt 1-2: At-grade Alt 1-3: Below-grade Alt 1-4: Through tracks elevated, station tracks at-grade Alt 1-5: Through tracks below-grade, station tracks at-grade.	▪ All bisect a historic structure (Southern Pacific Depot). Opportunities for mitigation require further investigation. ▪ Alt 1-2 would disrupt the street grid, requiring grade separations to maintain connectivity. ▪ Alt 1-3 does not disrupt the street grid, although it requires more than 7 miles of tunnel through central Fresno and an underground station. ▪ Under Alt 1-4, the separation between the elevated through tracks (220 mph) and the at-grade station tracks (110 mph) would be complex to design, particularly given the height required to cross over State Routes 180 and 41. It would also involve the disruptions of the street grid associated with the at-grade profile. ▪ Under Alt 1-5 the separation between the below-grade through tracks (220 mph) and the at-grade station tracks (110 mph) would be complex to design. It would also involve the disruptions of the street grid associated with the at-grade profile.	Alts 1-1 and 1-2	Alts 1-3, 1-4, and 1-5
Alternative Family 2 West of UPRR	Alt 2-1: Elevated Alt 2-2: At-grade Alt 2-3: Below-grade Alt 2-4: Through tracks elevated, station tracks at-grade Alt 2-5: Through tracks below-grade, station tracks at-grade.	▪ All traverse eastern margin of Roeding Park, either on aerial structure or below-grade, although crossovers could mitigate impact. ▪ The alternatives would involve the same issues associated with their counterparts under Family 1.	Alts 2-1 and 2-2	Alts 2-4 and 2-5
Alternative Family 3 Golden State Blvd	Alt 3-1: Elevated Alt 3-2: Below-grade	▪ Both Alts traverse Roeding Park on elevated structure. ▪ Alt 3-1 traverses Chinatown district on elevated structure. Although Chinatown is not a designated historic landmark district, it is recognized as part of Fresno's heritage of cultural diversity. ▪ Alt 3-2 does not conflict with at-grade uses, but it requires more than 7 miles of tunnel through central Fresno and an underground station. Within Chinatown, the below-grade guideway could affect subsurface cultural resources.	Alt 3-2	Alt 3-1

Table 3-2. Fresno Subsection Initial Alternatives Retained and Removed

Family/Option	Variations	Evaluation	Carried Forward	Not Carried Forward
Alternative 4 State Route 99	N/A	▪ Traverses Roeding Park. ▪ Station location farthest from the central business district and thus least consistent with local planning and economic development objectives.		Alt 4
Option 2 Western Bypass	N/A	▪ Impacts agricultural land west of Fresno. ▪ Allows express trains to operate at full speed outside central Fresno, reducing impact to neighboring land uses. ▪ 2-track cross-section through central Fresno, designed for 110 mph operation, allows greater flexibility and causes fewer impacts than a 220-mph 2-track cross-section. ▪ Split track scenario adds design and construction complexity and duplication, as well as uncertainties associated with construction staging. ▪ City and County of Fresno submitted letter jointly opposing the Western Bypass.		Option OP 2

mph = miles per hour

A study of potential stations in the Visalia area (in the Rural Subsection) had been conducted in 2007 in accordance with the findings of the Statewide Program EIR/EIS (URS/HMM/Arup JV, 2007). These potential station locations remained in consideration through the Alternatives Analysis process. HST alignments that could serve a Visalia area station were therefore carried forward. Each of the Fresno area alternatives was developed, therefore, with variations in the south of Fresno that would connect with alignments in the Rural Subsection paralleling either the BNSF right-of-way or the UPRR right-of-way to allow for this connection.

Every alternative has been designed in accordance with the Authority's design standards, including such parameters as horizontal curve radius, maximum gradient, length of stations and station tracks, and location of turnouts (switches). Most importantly, design of the entire section is intended to enable operating speeds of 220 mph, which will facilitate travel times of no more than 2 hours and 40 minutes between San Francisco and Los Angeles.

For consistency across the different Subsections within the Fresno to Bakersfield Section, the alternatives carried forward were renamed. The new alignment names are described in Table 3-3, and shown on Figure 3-3.

Table 3-3. Fresno Subsection Alternatives Retained for Detailed Alternatives Analysis

New Designation		Through Fresno	South of Fresno	Original Nomenclature
Elevated	At-Grade			
B1	B7	UPRR West	BNSF	Alternatives 2-1 and 2-2 – West of UPRR
B2	B8	UPRR East		Alternatives 1-1 and 1-2 – East of UPRR
B3	B9	Golden State Blvd		Alternative 3-1 – Golden State Blvd
B4	B10	UPRR West	UPRR	Alternatives 2-1 and 2-2 – West of UPRR
B5	B11	UPRR East		Alternatives 1-1 and 1-2 – East of UPRR
B6	B12	Golden State Blvd		Alternative 3-1 – Golden State Blvd

B1: UPRR West Elevated – BNSF South of Downtown

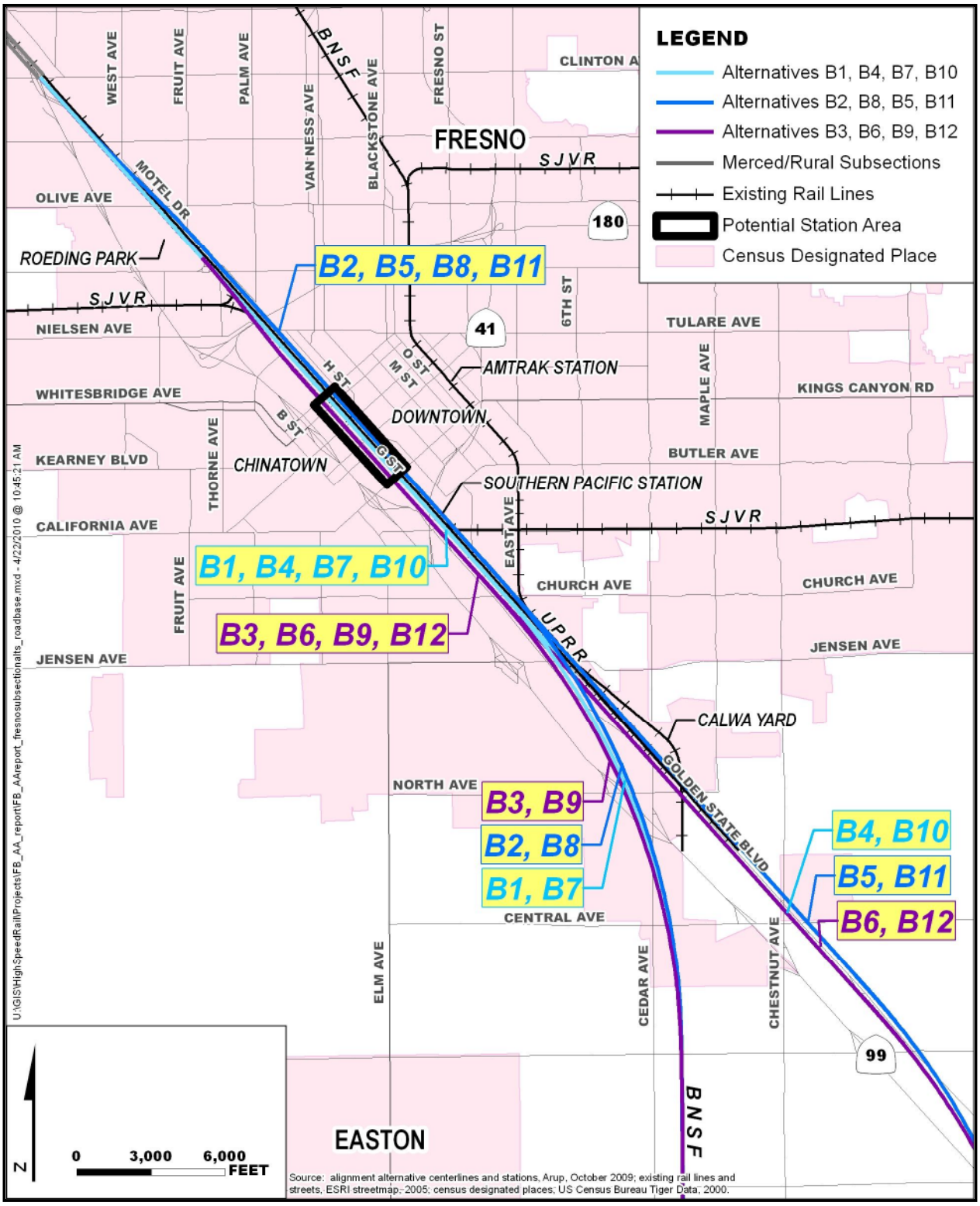
Between Clinton Avenue and West Olive Avenue, the two-track alignment is adjacent to western boundary of the UPRR right-of-way. The alignment is at-grade and within the existing Golden State Boulevard footprint. A variety of motels, industrial uses, general commercial uses, and a mobile home park are located between West Clinton Avenue and West Olive Avenue. South of West Olive Avenue, the alignment continues generally parallel to the UPRR alignment, but transitions to an elevated trackway with a realigned Golden State Boulevard running beneath, or adjacent to, the HST alignment.

The alignment passes through and along the eastern side of Roeding Park between West Olive Avenue and West Belmont Avenue. The vertical alignment ascends to an elevation of about 60 feet above existing grade to pass over SR-180, the San Joaquin Valley Railroad (SJVR) track, and other central Fresno existing grade separations.

About 1,000 feet south of Divisadero Street, the two-track guideway transitions to four tracks (two mainline and two station tracks) for the northern station approach. After passing the station, the guideway narrows to a two-track alignment between Ventura Avenue and Santa Clara Street.

The alignment remains at the same elevation and generally parallel to the UPRR right-of-way until reaching East Florence Avenue. The horizontal alignment begins a westerly curve at East Florence Avenue toward the existing BNSF alignment south of Fresno. The vertical alignment remains elevated

Figure 3-3. Fresno Subsection – Alternatives Retained for Detailed Alternatives Analysis



until approximately East North Avenue, where it begins to descend, passing over SR-99, and reaching existing grade to parallel the BNSF near East Malaga Avenue before meeting the Rural Subsection.

B2: UPRR East Elevated – BNSF South of Downtown

The two-track alignment begins on the western side of the existing UPRR right-of-way at West Clinton Avenue, and almost immediately enters a reversing curve that allows the HST to be routed, via elevated trackway over the UPRR corridor, to the eastern side of the UPRR corridor at West Olive Avenue. The alignment crosses the UPRR at a very shallow angle, necessitating a structure straddling the UPRR for about 2,000 feet. After crossing the UPRR right-of-way , the trackway continues to ascend to an elevation about 60 feet above existing grade.

Land uses along the eastern side of the UPRR right-of-way consist principally of residential subdivisions until East Belmont Avenue. Land use changes to industrial, commercial, and core downtown land uses until SR-41, where heavy industrial uses begin.

About 1,000 feet south of Divisadero Street, the two-track guideway transitions to four tracks (two mainline and two station tracks) for the northern station approach. The transition back to two tracks ends near Santa Clara Street.

Near Calwa Yard the alignment crosses the UPRR tracks at a very shallow angle, necessitating a structure straddling the railroads over a length of at least 2,000 feet. The alignment may also necessitate straddling the BNSF right-of-way. The alignment would pass through heavily used industrial area until reaching East Central Avenue, where land use changes to agricultural.

The guideway remains at the same elevation and generally parallel and adjacent to the UPRR right-of-way until reaching East Florence Avenue, where it follows a route similar to Alternative B1, but shifted about 300 feet to the east. The elevated guideway begins to descend near the East Jensen Bypass grade separation, and returns to existing grade near East Central Avenue before meeting the Rural Subsection.

B3: Golden State Boulevard Elevated – BNSF South of Downtown

The two-track alignment generally follows the western side of the UPRR right-of-way between West Clinton Avenue and West Olive Avenue. South of West Olive Avenue, it begins to widen to a four-track cross section and gain elevation to pass over SR-180. A reverse curve is needed to divert the trackway from the eastern side of Roeding Park, to eventually be adjacent to South Golden State Boulevard south of SR-41.

To comply with HST station design criteria, the point of divergence of the station track turnouts under this alternative needs to be substantially farther north than is the case for all other alternatives, because of the curves and spirals necessary to transition from the UPRR right-of-way to align with Golden State Boulevard. Approximately 18,000 feet of total additional station approach track and an overall larger footprint would be needed for this alternative.

The alignment continues southward adjacent to the western side of G Street through the station before passing through industrial, commercial, and retail uses, as well as the Chinatown neighborhood. The four-track cross section transitions to two tracks near Santa Clara Street. After crossing over SR-41, the alignment runs adjacent to the eastern side of South Golden State Boulevard through industrial areas and begins to curve westward toward the existing BNSF alignment south of East Florence Avenue. The alignment passes mainly through industrial areas until reaching East Central Avenue. The elevated guideway begins to descend near East North Avenue, and reaches existing grade between East Central and East Malaga Avenues before connecting with the Rural Subsection.

B4: UPRR West Elevated – UPRR South of Downtown

The horizontal alignment, corridor widths, station, and land use would be the same as Alternative B1 between West Clinton Avenue and Santa Clara Street, where the alternative would return to a two-track mainline cross section. South of Santa Clara Street the vertical profile transitions back to grade. Alternative B4 remains generally parallel and adjacent to the westerly boundary of the existing UPRR right-of-way to the vicinity of East American Avenue, where the alignment begins to curve westerly and pass over the UPRR and SR-99.

South of the East Jensen Bypass, the guideway passes over South Golden State Boulevard, East North Avenue, and the BNSF mainline leading into the Calwa Yard. Also of possible significance in this area is the BNSF industrial park lead track that runs generally parallel to the alignment for about 2,000 feet between East North Avenue and Cedar Avenue. After passing East American Avenue, the guideway rises over SR-99 and continues southward, before descending to meet the Rural Subsection at-grade.

B5: UPRR East Elevated – UPRR South of Downtown

The horizontal alignment, vertical profile, corridor widths, station, and land use would be the same as Alternative B2 between West Clinton Avenue and East Church Avenue. Where Alternative B2 curves to the west at East Church Avenue, Alternative B5 continues generally adjacent to the eastern side of the UPRR corridor, to the vicinity of American Avenue. Between the East Jensen Bypass and East North Avenue, the alignment would be between the parallel BNSF and UPRR mainline tracks, and then would traverse a portion of the BNSF Calwa Yard.

South of the East Jensen Bypass, the vertical profile remains elevated through Calwa Yard and returns to existing grade near South Chestnut Avenue. It remains at grade for about 2,000 feet before ascending again to pass over the UPRR corridor, South Golden State Boulevard, SR-99, and East Clayton Avenue. The elevated trackway and transition structures end at East Adams Avenue, where the alignment meets the Rural Subsection.

B6: Golden State Boulevard Elevated – UPRR South of Downtown

The horizontal alignment, vertical profile, corridor widths, station, and land use would be the same as under Alternative B3 between West Clinton Avenue and East Church Avenue. At East Church Avenue, where Alternative B3 curves to the west, Alternative B6 begins to curve to the east to become generally parallel to the western side of the existing UPRR corridor. The horizontal alignment remains generally parallel to the UPRR corridor between South Orange Avenue and East American Avenue. The horizontal alignment then curves to the west, where it meets the Rural Subsection at East Adams Avenue in Fowler.

The vertical profile continues at the same elevation of about 60 feet above existing grade, until it begins to descend near the East Jensen Bypass. The elevated trackway and transition structures return to existing grade near South Chestnut Avenue, and continue at existing grade to the vicinity of East American Avenue. The vertical profile then begins to ascend again to pass over SR-99 and East Clayton Avenue, returning to grade prior to meeting the Rural Subsection.

B7: UPRR West At-Grade – BNSF South of Downtown

The horizontal alignment, corridor widths, station, and land use, would be generally the same as Alternative B1. The vertical profile would remain at-grade between West Clinton Avenue and the vicinity of East Church Avenue. Elevated trackway and transition structures would be needed between East Church Avenue and East Malaga Avenue to allow the HST to pass over Orange Avenue, South Golden State Boulevard, East North Avenue, SR-99, and the BNSF North Avenue industrial area. After clearing SR-99, the vertical profile would continue at-grade until it meets the Rural Subsection.

B8: UPRR East At-Grade – BNSF South of Downtown

The horizontal alignment, corridor widths, station, and land use, would be generally the same as Alternative B2. The vertical profile would be generally at existing grade except for a long grade separation needed to get the HST over the UPRR corridor at the northern end (vicinity of West McKinley Avenue and West Olive Avenue), and for about five miles at the southern crossing back over the UPRR corridor, the BNSF, East Jensen Bypass, Golden State Boulevard, the BNSF North Avenue industrial area, East North Avenue, and SR-99 at the southern end. The alternative ends where the alignment meets the Rural Subsection at grade.

B9: Golden State Boulevard At-Grade – BNSF South of Downtown

The horizontal alignment, corridor widths, station, and land use, would be generally the same as Alternative B3. The vertical profile would be at existing grade except for about 3½ miles of elevated trackway to pass over the East Jensen Bypass, South Golden State Boulevard, Orange Avenue, the BNSF North Avenue industrial area lead, East North Avenue, and SR-99. The alternative ends at East South Avenue, where the alignment meets the Rural Subsection at grade.

B10: UPRR West At-Grade – UPRR South of Downtown

The horizontal alignment, corridor widths, station, and land use, would be generally the same as Alternative B4. The vertical profile would be generally at existing grade, except between West Clinton Avenue and the East Jensen Bypass. This alternative would include the two subsections of elevated trackway described in Alternative B4 to pass over South Golden State Boulevard, East North Avenue, and the BNSF mainline, as well as SR-99 south of East Jefferson Avenue. It ends where the alignment meets the Rural Subsection at grade.

B11: UPRR East At-Grade – UPRR South of Downtown

The horizontal alignment, corridor widths, station, and land use, would be generally the same as Alternative B5. The two-track alignment begins on the western side of the existing UPRR corridor at West Clinton Avenue, and almost immediately enters a reversing curve that routes the HST via elevated trackway, over the UPRR corridor, to the eastern side of the UPRR corridor at West Olive Avenue. The guideway would begin by passing over the UPRR corridor as with Alternative B5, but would return to existing grade before reaching SR-180, where it would continue at existing grade to the vicinity of South Van Ness Avenue. The guideway would then ascend again to pass over East Church Avenue, East Jensen Bypass, the BNSF mainline corridor, Calwa Yard, and East North Avenue. South of Calwa Yard, Alternative B11 is the same as Alternative B5 until it meets the Rural Subsection.

B12: Golden State Boulevard At-Grade – UPRR South of Downtown

Most features and impacts, including horizontal alignment, corridor widths, station, and land use impact, would be generally the same as Alternative B6. The vertical profile would remain at existing grade between West Clinton Avenue and East Jensen Bypass, where it would rise to pass over Golden State Boulevard, East North Avenue, and the BNSF North Avenue industrial area lead track, and the BNSF mainline corridor. The elevated trackway would return to existing grade near South Chestnut Avenue, but begin to ascend again through the same limits as Alternative B6 to pass over SR-99 and East Clayton Avenue, before descending to meet the Rural Subsection.

3.3.2. Rural Subsection

The Rural Subsection begins at E. Manning Avenue in Fresno and continues south to Hageman Road in Rosedale, northwest of Bakersfield. Alignments in this subsection cross largely agricultural land in Fresno, Kings, Tulare, and Kern counties, and either go through or skirts around the cities of Fowler, Selma, Kingsburg, Hanford, Visalia, Corcoran, Wasco, and Shafter.

Initial Review of Alternatives

This section describes and evaluates the initial alternatives developed for consideration as part of the *Visalia-Tulare-Hanford Station Feasibility Study*, along with the Statewide Program EIR/EIS Preferred Alignment and alternatives developed based on input from agency officials and stakeholders. It then explains the selection of which alternatives to carry forward for further analysis and describes the project alternatives to be analyzed in Section 4.0 of this report.

Description of Initial Alternatives

The initial alternatives originated from a variety of sources. First, the Preferred Alignment from the Statewide Program EIR/EIS was included. Second, responding to the commitment made in the Statewide Program EIR/EIS to investigate alternatives that serve a potential station in the Visalia-Tulare-Hanford area, the *Visalia-Tulare-Hanford Station Feasibility Study* identified several alternative alignments. Third, initial alternatives were developed in response to input from local, state, and federal agency officials and stakeholders during the scoping process.

The initial alternatives reflected combinations of four variables: the primary route (either BNSF, UPRR, or a combination); the approach to passing through or by communities of Fowler, Selma, and Kingsburg (either through town or bypass); the location of the transition from the UPRR corridor to the BNSF corridor (either northern or southern for the combination routes); and the locations of potential stations in the Visalia-Tulare-Hanford area (198 East and West, 99 North and Center). Table 3-4 describes how each of the initial alternatives combined these variables and Figure 3-4 shows alternative alignments.

Table 3-4. Rural Subsection Initial Alternatives

Alternative*	Route	Fowler-Selma-Kingsburg	Station
A (PEIR/EIS Preferred)	BNSF Hanford West Bypass	N/A	None
A-1	BNSF Hanford East Bypass	N/A	198 West
B-1	UPRR	Through Town	99 North
B-2	UPRR	Bypass	99 North
D-1	UPRR to BNSF Northern Transition	Through Town	198 East, 99 Center
D-2	UPRR to BNSF Northern Transition	Bypass	198 East, 99 Center
E-1	UPRR to BNSF Southern Transition	Through Town	99 North
E-2	UPRR to BNSF Southern Transition	Bypass	99 North
3-B	BNSF-Straight South of Corcoran West	N/A	198 West
3-C	BNSF-Straight South of Corcoran East	N/A	198 West

- 198 West Station, approximately 3 miles east of Hanford
- 198 East Station, approximately 1 to 1 ½ miles southwest of SR 198/SR99
- 99 North Station, near Goshen Junction
- 99 Center Station, approximately 4 ½ miles west of Visalia

Evaluation of Initial Alternatives

The initial alternatives were reviewed to determine if they met the project purpose and need, resulted in impacts on community resources, conflicted with existing or planned development, or deviated from desired design performance criteria as defined in the *Alternatives Analysis Methods for Project EIR/EIS Technical Memorandum Version 2* (October 2009). They were then evaluated for their ability to maximize design standards, minimize disruption to neighborhoods and communities, and minimize impacts on environmental resources. Detailed evaluations of the initial alternatives and the evaluation

recommendations are described in the *Final Initial Screening Memorandum-Rural Area* (Appendix E-2 of this report).

The initial alternatives evaluation results were considered by the Authority and FRA and several alternatives were withdrawn from further consideration on the basis of environmental issues, such as potential disruption Section 4(f) properties, engineering issues, such as complexity of construction; or community impacts. The evaluation results are show in Table 3-5.

The following initial alternatives were not carried forward for further evaluation in the alternatives analysis:

- Alternative B-1
- Alternative B-2
- Alternative D-1
- Alternative E-1
- Alternative E-2
- Alternative 3-B
- Alternative 3-C

The following initial alternatives were carried forward for further evaluation in the alternatives analysis:

- Alternative A-Program EIR/EIS Preferred Alignment
- Alternative A-1
- Alternative D-2

B. Detailed Description of Alternatives Carried Forward for Alternatives Analysis

For consistency across the different sections within the Fresno to Bakersfield Section, the alternatives carried forward were renamed. In addition to the renaming process, planning efforts in the BNSF corridor were focused on the alternatives on the eastern side of Hanford. The Program EIR/EIS Preferred Alignment was carried forward as the local design option west of Hanford. The new alignment names, along with their corresponding stations, are shown in Figure 3-5 and described in Table 3-6.

The alternatives carried forward for the Rural Subsection are described below.

C1: BNSF-Hanford East Bypass, Hanford Station Option – Shared Right-of-Way

Alternative C1 represents a development of the Program EIR/EIS Preferred Alignment, which bypasses Hanford to the east to allow possible provision of a station that serves the Visalia–Tulare–Hanford area (Station 198 West). Where possible, in the sections where it runs parallel with the BNSF tracks, the alignment would make maximal shared use of the BNSF right-of-way. The BNSF tracks would be moved to one side of the right-of-way, retaining enough width for future provision of two BNSF tracks in locations where there currently is only one track. The alignment would be placed in a combined right-of-way made up of a portion of the BNSF right-of-way, and new right-of-way.

Figure 3-4. Rural Subsection – Initial Alternatives Evaluated

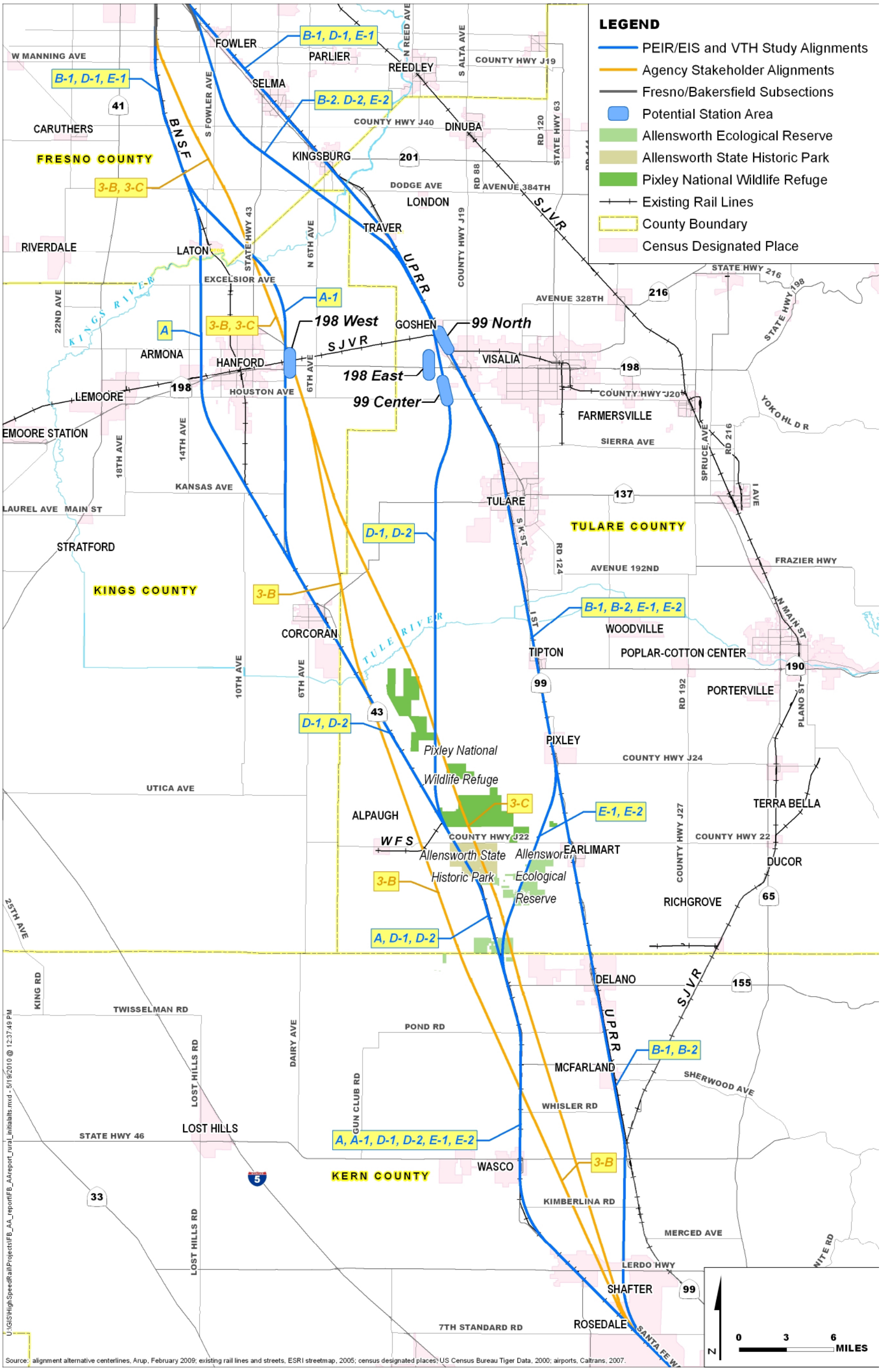


Table 3-5. Rural Subsection – Evaluation of Initial Alternatives

Alternative Name	Alignment Description	Evaluation Comments	Carried Forward	Not Carried Forward
A (PEIR/EIS Preferred) ▪ BNSF Hanford West ▪ No Station	Adjacent to BNSF right-of-way from south of Fresno to Rosedale, northwest of Bakersfield. Bypasses Hanford to the west, leaving the BNSF corridor south of Laton and rejoining north of Corcoran. Passes through or close to Laton, Corcoran, Wasco, and Shafter.	▪ Potential impacts on Section 4(f) properties require further analysis and investigation. ▪ Construction and community impacts through Corcoran, Wasco, and Shafter could be large and require further evaluation. ▪ Could result in severance of BNSF spur tracks.	X	
A-1 ▪ BNSF Hanford East ▪ 198 West Station	Refinement of the Program EIR/EIS Preferred Alignment, with the bypass of Hanford shifted to east of Hanford to serve a potential station east of Hanford, per *Visalia-Tulare-Hanford Station Feasibility Study.* Adjacent to BNSF right-of-way throughout, except for the eastern bypass of Hanford between a location south of Conejo and a location north of Corcoran, where it parallels SR-43. Local variations of vertical alignments through and bypasses around Corcoran, Wasco, and Shafter.	▪ No potential impacts on environmental resources that would render alternative infeasible. ▪ Construction and community impacts through Corcoran, Wasco, and Shafter could be large and require further evaluation. ▪ Could result in severance of BNSF spur tracks.	X	
B-1 ▪ UPRR ▪ FSK* through town ▪ 99 North Station	Originated from *Visalia-Tulare-Hanford Station Feasibility Study.* Uses existing UPRR right-of-way from Fresno to south of McFarland, where it transitions to BNSF right-of-way near Rosedale. Through Fowler, Selma, and Kingsburg, with potential for below-grade construction in places.	▪ No potential impacts on environmental resources that would render alternative infeasible. ▪ Much greater construction complexity than other alternatives because of the need for trench construction through Fowler, Selma, and Kingsburg. ▪ Greater potential noise, cultural, community, and property impacts than alternatives along the BNSF right-of-way. ▪ Requires cooperation of UPRR.		X
B-2 ▪ UPRR ▪ FSK* Bypass ▪ 99 North Station	Same as Alternative B-1, except for the western bypass of the cities of Fowler, Selma, and Kingsburg in south Fresno County.	▪ Fewer construction and community impacts than Alt B-1 as a result of the bypass of Fowler, Selma, and Kingsburg. ▪ Greater impact on agricultural land than Alt B-1. ▪ No potential impacts on environmental resources were identified that would result in this alternative being considered infeasible. ▪ Requires cooperation of UPRR.		X

Table 3-5. Rural Subsection – Evaluation of Initial Alternatives

Alternative Name	Alignment Description	Evaluation Comments	Carried Forward	Not Carried Forward
D-1 ▪ UPRR to BNSF Northern Transition ▪ FSK* Through Town ▪ 198 East, 99 Center Stations	Originated from Visalia-Tulare-Hanford Station Feasibility Study. Uses existing UPRR right-of-way from Fresno to Visalia, where it heads south to join BNSF right-of-way north of Allensworth State Historic Park	▪ No potential impacts on environmental resources that would render alternative infeasible. ▪ Much greater construction complexity than other alternatives because of the need for trench construction through Fowler, Selma, and Kingsburg. ▪ Requires cooperation of UPRR.		X
D-2 ▪ UPRR to BNSF Northern Transition ▪ FSK* Bypass ▪ 198 East, 99 Center Stations	Same as Alternative D-1, except for a western bypass of the cities of Fowler, Selma, and Kingsburg in south Fresno County.	▪ Less construction than Alt D-1 as a result of the bypass of Fowler, Selma, and Kingsburg. ▪ More impact on agricultural land than Alt D-1. ▪ No potential impacts on environmental resources that would render alternative infeasible.	X	
E-1 ▪ UPRR to BNSF Southern Transition ▪ FSK* Through Town ▪ 99 North Station	Originated from *Visalia-Tulare-Hanford Station Feasibility Study.* Uses existing UPRR right-of-way from Fresno, through Visalia and Tulare, to just south of Pixley, where it transitions to BNSF right-of-way near the Tulare-Kern County border. Below-grade through parts of Fowler, Selma, and Kingsburg in south Fresno County.	▪ Major adverse environmental impacts that would require substantial mitigation. Bisects a series of major vernal pool complexes between the cities of Alpaugh, Earlimart, and Delano. Not likely possible to realign the alternative to avoid these resources. ▪ Directly impacts Allensworth State Ecological Reserve ▪ Much greater construction complexity than other alternatives because of the need for trench construction through Fowler, Selma, and Kingsburg. ▪ Requires cooperation of UPRR,		X

Table 3-5. Rural Subsection – Evaluation of Initial Alternatives

Alternative Name	Alignment Description	Evaluation Comments	Carried Forward	Not Carried Forward
E-2 ▪ UPRR to BNSF Southern Transition ▪ FSK* Bypass ▪ 99 North Station	Same as Alternative E-1, except for use of a western bypass of the cities of Fowler, Selma, and Kingsburg in south Fresno County.	▪ Same adverse environmental impacts as Alt E-1. ▪ Fewer construction and community impacts than Alt E-1 as a result of the bypass of Fowler, Selma, and Kingsburg.		X
3-B ▪ BNSF-Straight South of Corcoran East ▪ 198 West Station	Originated from discussions with agency officials and stakeholders. Uses a new alignment east of BNSF right-of-way north of Hanford. Traverses east of SR-43 south of the Hanford station and then a new route west of the BNSF right-of-way south of Corcoran. Largely elevated, as proposed by the California Department of Fish and Game, to reduce impacts.	▪ Inconsistent with Purpose and Need objective to combine transportation corridors and minimize impacts on agricultural land. Avoids the need for grade crossings and reduces the severance issues, but has high capital and maintenance costs.		X
3-C ▪ BNSF-Straight South of Corcoran East ▪ 198 West Station	Originated from discussions with agency officials and stakeholders. Uses a new near-straight alignment from Bakersfield through the Hanford station to Fresno. Operates east of BNSF right-of-way north of Hanford, east of SR-43 south of Hanford station, and then stays east of the BNSF right-of-way past Corcoran, Wasco, and Shafter. Largely elevated, as proposed by the California Department of Fish and Game, to reduce impacts.	▪ Major adverse environmental impacts that may not be possible to mitigate even with an elevated solution. Bisects Pixley National Wildlife Refuge and Allensworth State Ecological Reserve. The extent of these resources indicated that they could not be avoided even with realignment of the alternative. ▪ Inconsistent with Purpose and Need objective to combine transportation corridors and to minimize impacts on agricultural land. ▪ Avoids the need for grade crossings and reduces the severance issues, but has high capital and maintenance costs.		X
*FSK=Fowler, Selma, and Kingsburg				

The alignment leaves Fresno on the western side of the BNSF tracks. Near Conejo, it crosses the BNSF tracks and runs in a southeasterly and then southerly direction towards the junction of SR-198 and SR-43. In this subsection, it crosses agricultural land and the Kings River. Potential station 198 West is in the vicinity of the SR-198 and SR-43 junction.

South of SR-198, the alignment parallels SR-43 to the east before rejoining the BNSF corridor north of Corcoran. The alignment crosses the BNSF tracks north of Corcoran, passes through Corcoran at grade, then follows on the western side of the BNSF right-of-way southwards. The alignment continues along the BNSF right-of-way past Allensworth, to north of Wasco. Through this area, the alignment crosses the Tule River and may impinge on the Colonel Allensworth State Historic Park and the Allensworth Ecological Reserve.

Southward, the alignment remains within the BNSF right-of-way, crossing to the eastern side in Wasco, and then passing through Shafter at grade on the eastern side of the BNSF, and remaining on that side south towards Bakersfield. At Rosedale, at the southern end of the Rural Subsection, the alignment is on the eastern side of the BNSF tracks.

C2: BNSF-Hanford East Bypass, Hanford Station Option – Separate Side Alignment

Alternative C2 is identical to Alternative C1, except where it is adjacent to the BNSF right-of-way. In these locations, the HST right-of-way is located as close as possible to the BNSF right-of-way without encroaching on it, except at the location of tight curves in the BNSF alignment, to reduce land take requirements; and within the towns of Wasco, where it crosses the BNSF right-of-way. This alignment should improve constructability and safety, but would increase the land acquisition requirements, which may be large in the following areas:

- Additional agricultural land acquisition.
- Additional building and property acquisitions in the towns of Corcoran, Wasco, and Shafter, or bypassing the towns.
- Greater impact on the Colonel Allensworth State Historic Park and Allensworth Ecological Reserve.

C3: BNSF-Hanford East Bypass, Hanford Station Option – East Side Alignment

Alternative C3 is identical to Alternative C2, except that between Corcoran and Wasco it remains on the eastern side of SR-43, and an east-side bypass is provided for the towns of Corcoran and Wasco. This alignment avoids two crossings of the BNSF tracks, and minimizes impact on the Colonel Allensworth State Historic Park, but results in isolating a tract of land between SR-43 and the HST right-of-way, impinging on the Pixley National Wildlife Refuge, and increasing impacts on the Allensworth Ecological Reserve.

C4: UPRR to BNSF, Visalia Station – Shared Right-of-Way

Alternative C4 represents an alignment that could serve a station nearer to Visalia and Tulare than Alternatives C1, C2, and C3. Where possible, in the sections where it runs parallel with the BNSF tracks, the alignment makes maximum use of the BNSF right-of-way through moving the BNSF tracks to one side of the right-of-way, while retaining enough width for future provision of two BNSF tracks in locations where there currently is only one, as in Alternative C1.

South of Fresno, the alignment is on the western side of SR-99. To the north of Fowler, the alignment runs south and then southeast to provide a bypass of the cities of Fowler, Selma, and Kingsburg before rejoining SR-99 south of Kingsburg. Through this area, the alignment crosses agricultural land and the Kings River.

Figure 3-5. Rural Subsection – Alternatives Retained for Detailed Analysis

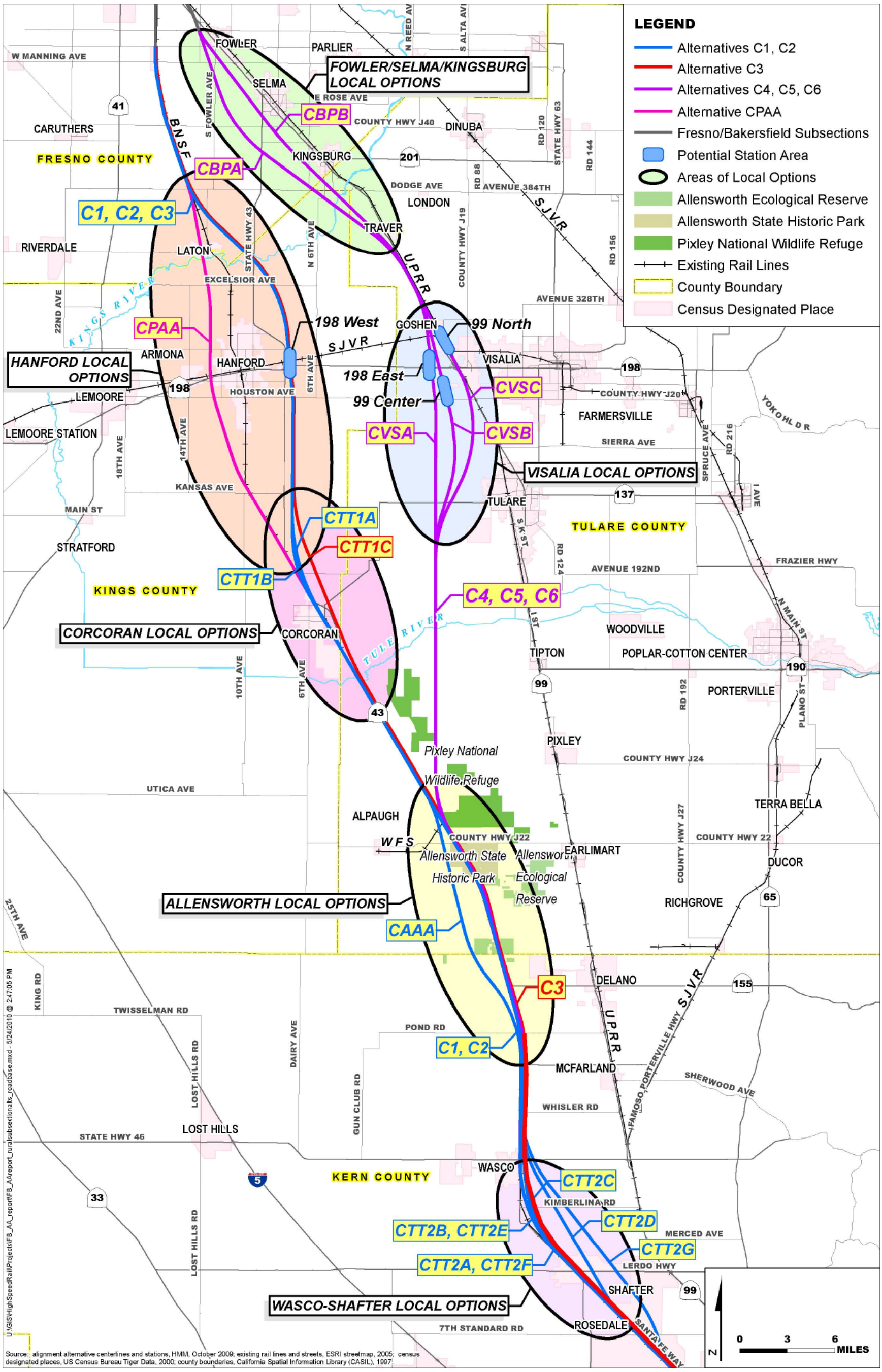


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Table 3-6. Rural Subsection – Alternatives Carried Forward to Alternatives Analysis

Alt.	Alignment	Initial Alternative Name	Stations			
			198 West	99 North	99 Center	198 East
C1	BNSF-Hanford East Bypass, Hanford Station Option – Shared Right-of-Way	A-1 – BNSF-Hanford East Bypass	X			
C2	BNSF-Hanford East Bypass, Hanford Station Option – Separate Side Alignment	A-1 – BNSF-Hanford East Bypass	X			
C3	BNSF-Hanford East Bypass, Hanford Station Option – East Side Alignment	A-1 – BNSF-Hanford East Bypass	X			
C4	UPRR to BNSF, Visalia Station – Shared Right-of-Way	D-2 – UPRR to BNSF (198 Station) – Fresno-South Bypass		X	X	X
C5	UPRR to BNSF, Visalia Station – Separate Side Alignment	D-2 – UPRR to BNSF (198 Station) – Fresno-South Bypass		X	X	X
C6	UPRR to BNSF, Visalia Station – East Side Alignment	D-2 – UPRR to BNSF (198 Station) – Fresno-South Bypass		X	X	X
Local Options			**198 West**	**99 North**	**99 Center**	**198 East**
CPAA	A: BNSF Hanford West Bypass	Program EIR/EIS Preferred Alignment	n/a	n/a	n/a	n/a
CTT1	**Corcoran Through Town** A. At-Grade, West side of BNSF At-Grade B. Elevated, East side of BNSF Elevated C. Bypass, East side of Town	n/a	n/a	n/a	n/a	n/a
CTT2	**Wasco/Shafter – Through Town** A. At grade, on east side of BNSF in both towns B. Elevated in both towns C. Wasco bypass, east side bypass, at grade through Shafter D. Wasco and Shafter east bypass at grade E. Elevated through Wasco, at grade through Shafter F. At grade through Wasco and elevated through Shafter G. Wasco/Shafter/7th Standard Road east bypass at grade	n/a	n/a	n/a	n/a	n/a
CBP	**Fowler, Selma, Kingsburg Bypass** A. Greenfield B. Near town	n/a	n/a	n/a	n/a	n/a
CVS	**Visalia Station Options** A. 198 East B. 99 Center C. 99 North	n/a	n/a	X	X	X

The alignment continues south on the western side of SR-99 as far as the area of the interchange with SR-198, where it runs southwards. Potential stations are in the area of this interchange to the northwest and south of Visalia (99 North, 99 Center, and 198 East).

From Visalia, the alignment runs south across agricultural land, crossing the Tule River and passing close to the Pixley National Wildlife Refuge to join the BNSF right-of-way north of Allensworth. The alignment crosses SR-43 and the BNSF tracks to the western side, and then runs parallel and adjacent to the BNSF right-of-way, remaining on the western side of the BNSF right-of-way north of Wasco. In this area, the alignment may impinge on the Pixley National Wildlife Refuge, Colonel Allensworth State Historic Park, and the Allensworth Ecological Reserve.

Southward, the alignment remains within the BNSF right-of-way on its western side, crossing to the eastern side in Wasco and continuing on the eastern side through Shafter at grade. It then remains at-grade south towards Bakersfield. At Rosedale, at the southern end of the Rural Subsection, the alignment is on the eastern side of the BNSF tracks.

C5: UPRR to BNSF, Visalia Station – Separate Side Alignment

The C5 alignment is identical to the C4 alignment, except when adjacent to the BNSF right-of-way, where the HST right-of-way is located as close as possible to the BNSF right-of-way without encroaching on it, except within the town of Wasco, where it may cross the BNSF right-of-way. This alignment should improve constructability and safety, but would increase the land acquisition requirements, which may be large in the following areas:

- Additional agricultural land acquisition.
- Additional building and property acquisitions in the towns of Wasco and Shafter.
- Greater impact on the Colonel Allensworth State Historic Park and Allensworth Ecological Reserve.

C6: UPRR to BNSF, Visalia Station – East of Side Alignment

The C6 alignment is identical to the C4 and C5 alignments, except in the area joining the BNSF right-of-way north of Allensworth and Wasco, where the alignment remains on the eastern side of SR-43. This alignment avoids the two crossings of the BNSF tracks and minimizes impact on the Colonel Allensworth State Historic Park, but results in isolating a strip of land between SR-43 and the HST right-of-way; impinging on the Pixley National Wildlife Refuge, and increasing impacts on the Allensworth Ecological Reserve.

Local Options

A number of options have been developed to address specific localized conditions along the route:

- CPAA: Hanford West Bypass (Program EIR/EIS Preferred Alignment)
- CBP: Fowler, Selma, and Kingsburg Bypass – Options for Alternatives C4, C5, and C6
- CTT1: Corcoran Options – Options for Alternatives C1, C2, and C3
- CTT2: Wasco and Shafter Options – Options for Alternatives C1, C2, C3, C4, C5, and C6
- CVS: Visalia Station Options – Options for Alternatives C4, C5, and C6

CPAA Hanford West Bypass (Program EIR/EIS Preferred Alignment)

- This local option represents the portion of the Program EIR/EIS Preferred Alignment to the west of Hanford between approximately Laton and Corcoran, connecting with the base Alternative C1 in the BNSF corridor for the remainder of the corridor alignment. This option resulted from the Program EIR/EIS Preferred Alignment, and was retained for comparative purposes when the

primary focus in the BNSF corridor shifted to the east side of Hanford, in order to serve a potential station in that area.

CBP Fowler, Selma, and Kingsburg Bypass – Options for C4, C5, and C6

- Greenfield: This alignment was developed during the Visalia–Tulare–Hanford Station Feasibility Study in 2007. It passes up to 2.8 miles to the west of the towns through agricultural land.
- **Near town:** An alignment closer to the towns was developed to optimize travel time and reduce impacts to agricultural land. This alignment skirts the towns immediately beyond the edges of the current urban areas.

CTT1 Corcoran Options – Options for C1, C2, and C3

- CTT1A (At-grade): This alignment crosses the BNSF right-of-way on a viaduct north of Corcoran, and descends to an at-grade alignment near Patterson Avenue on the western side of the BNSF tracks. This alignment avoids major impacts to the BNSF operations on the eastern side of the mainline; however, it would require extensive reconfiguring of the local road network and relocation of the Amtrak station.
- CTT1B (Elevated): This alignment enters Corcoran from the north on a viaduct on the eastern side of the BNSF right-of-way, and crosses to the west to the south of Corcoran. This alternative moves the alignment farther from the main urban center of Corcoran on the west side of the BNSF; because it is elevated, it can be designed to minimize impacts to and reconfiguring of the BNSF operations. No highway grade-separated crossings would be required for an elevated solution as the existing BNSF crossings would be preserved.
- **CTT1C (Bypass):** The bypass alternative remains on the eastern side of the Corcoran up to 0.7 mile from the BNSF tracks and minimizes impacts to the towns while increasing impacts to agricultural land. Grade separations are required where local roads cross the alignment; however, these are unlikely to have a severe impact on the surrounding road network.

CTT2 Wasco and Shafter Options – Options for C1, C2, C3, C4, C5, and C6

- CTT2A (At-grade through both towns): This alternative passes through Wasco on the eastern side of the BNSF mainline with major impacts to the spurs and businesses on this side of the track, and requires extensive reconfiguring of the existing road network to provide grade separations. The alignment swings to the east at the southern end of the town to accommodate the BNSF curve into Shafter. The alignment rejoins the BNSF corridor and passes through Shafter on the eastern side of the BNSF tracks. Through Shafter, the alignment has major impacts to BNSF operations and the existing road network.
- CTT2B (Elevated through both towns): This alternative enters Wasco on the western side of the BNSF tracks and is elevated through Wasco, moving from the western side to the eastern side. As a result of being elevated, the impacts on BNSF operations are reduced, although some reconfiguration is required. This option has no major impact on the existing road network. The alignment swings to the east at the southern end of the town to accommodate the BNSF curve into Shafter. The alignment rejoins the BNSF right-of-way and passes through Shafter on the eastern side of the BNSF tracks. Through Shafter, the alignment is elevated, reducing impacts on BNSF operations and the existing road network.
- CTT2C (Wasco Bypass): This at-grade alternative follows a bypass some 0.2 mile to the east of Wasco at grade. This minimizes impacts on the towns and BNSF, but increases agricultural impacts. Grade separations are required for existing roads that cross the alignment. South of Wasco, the alignment swings to the east and joins the BNSF right-of-way north of Shafter. The alignment proceeds through Shafter on the same at-grade alignment as Alternative CTT2A, although an elevated alternative could also be considered.
- CTT2D (Wasco and Shafter Bypass): This at-grade alternative provides a bypass to the east of both Wasco (0.3 mile from the BNSF tracks) and Shafter (0.8 mile from the BNSF tracks), which avoids impacts on BNSF operations, and reduces impacts on the towns but increases agricultural impacts.

- CTT2E (Elevated Wasco and at-grade Shafter): This alternative combines the at-grade and elevated alignments CTT2A and CTT2B described above. It is elevated through Wasco moving from the western side to the eastern side through the town, and then swings east to accommodate the BNSF turn into Shafter. It then runs through Shafter at grade on the eastern side of the BNSF tracks.
- CTT2F (At-grade Wasco and elevated Shafter): This alternative also combines the at-grade and elevated alignments CTT2A and CTT2B described above. It is at-grade through Wasco on the eastern side of the BNSF tracks, and then swings east to accommodate the BNSF turn into Shafter. It then runs through Shafter on a viaduct on the eastern side of the BNSF tracks.
- **CTT2G (7th Standard Road East Bypass**): This at-grade alternative provides a bypass of Wasco and Shafter that is farther to the east than CTT2D in order to further minimize impacts on planned industrial development south of Shafter and reduce the amount of elevated construction required. Agricultural impacts are greater under this alternative, which also bisects a planned 1,600-acre mixed-use development south of 7th Standard Road.

CVS Visalia Station Options – Options for C4, C5, and C6

- CVSA (198 East): This is the base alignment, and follows a more direct alignment south from the UPRR corridor across agricultural land. It services a station close to SR-198 to the west of the interchange with SR-99. This alignment requires a viaduct for the SJVR and SR-198 crossings.
- CVSB (99 Center): This alignment swings to the east of the baseline alignment to service a station to the south of SR-198. This alignment requires a viaduct for the SJVR and SR-198 crossings.
- **CVSC (99 North):** This alignment swings to the east of the baseline alignment to service a potential HST station in Goshen. This alignment partly follows the UPRR right-of-way, and requires an elevated alignment through Goshen to reduce impacts to UPRR operations.

3.3.3. Bakersfield Subsection

The Bakersfield Subsection begins at Hageman Road in Rosedale, northwest of Bakersfield, where it meets the Rural Subsection. It continues through downtown Bakersfield and terminates at Oswell Street, southeast of downtown, where it meets the Bakersfield to Palmdale Section. The evaluation of alternatives for the Bakersfield to Palmdale Section are described in the forthcoming *Preliminary Alternatives Analysis Report for the Bakersfield to Palmdale Section.*

A. Initial Review of Alternatives

Alternatives were developed, refined, and evaluated in an iterative process. The development and evaluation of initial alternatives is documented in the *Final Initial Screening Memorandum – Bakersfield Area* (Appendix E-3 of this report). This section describes the initial alternatives developed with input from the community and the TWG. It then explains the selection of which alternatives to carry forward for further analysis and describes the project alternatives to be analyzed in Section 4.0 of this report.

Description of Initial Alternatives

The preliminary alternatives were all variations of the Statewide Program EIR/EIS Preferred Alignment and were developed to reduce potential effects on surrounding land uses and address community concerns in Bakersfield, as well as to locate an HST station in Downtown Bakersfield, near the existing Amtrak Station.

Figure 3-6 shows the alternatives and associated station locations considered in the initial analysis.

Figure 3-6. Bakersfield Subsection – Initial Alternatives Evaluated

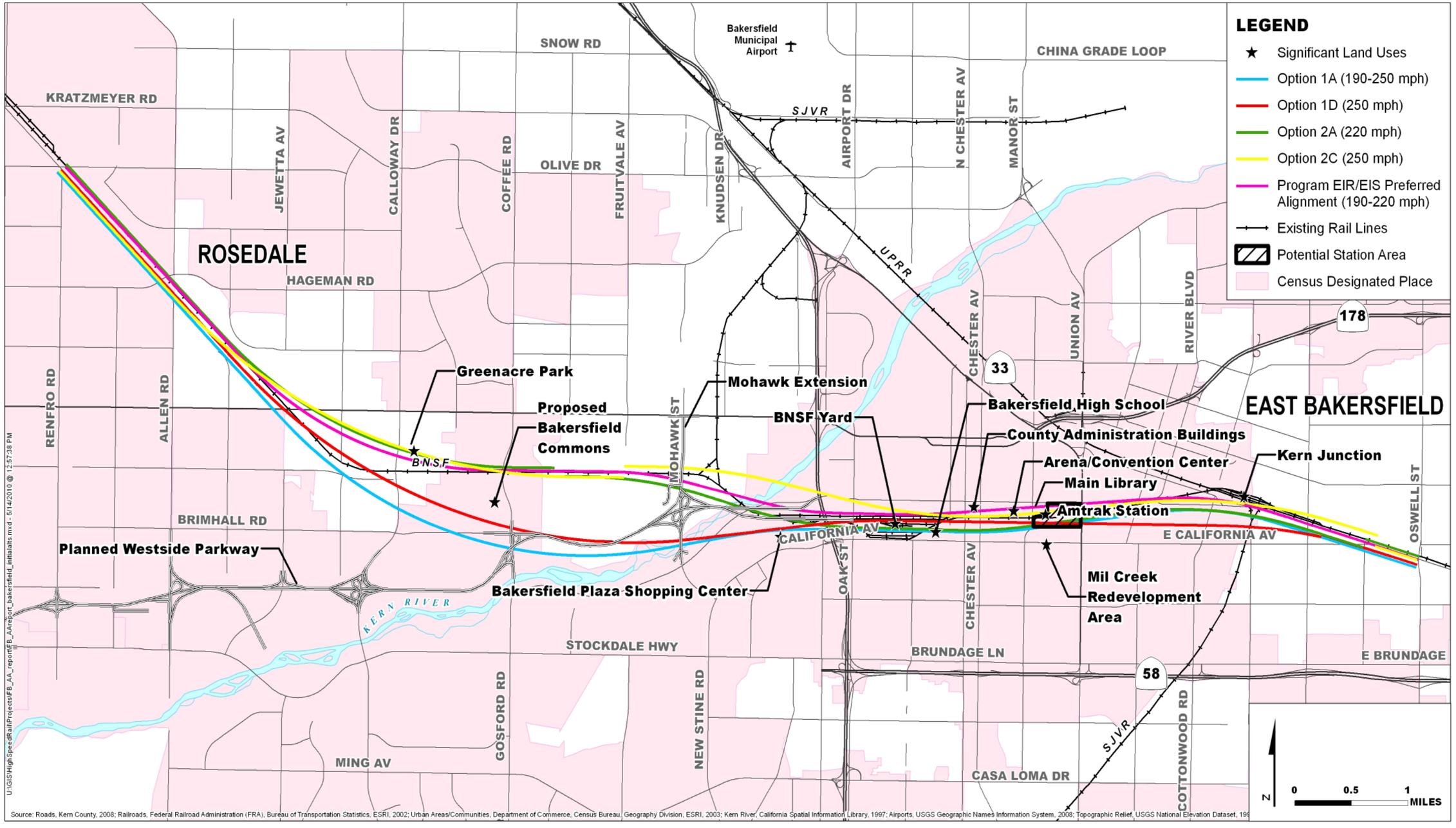

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Table 3-7 summarizes the evaluation of the initial alternatives considered and shows which were carried forward and which were eliminated from further consideration as part of the alternatives analysis process.

Evaluation of Initial Alternatives

The alternatives described in Table 3-15 were subjected to an initial review as described in the Fresno Subsection.

The geometries of the initial alternatives and the initial evaluation recommendations are described the *Initial Screening Memorandum – Bakersfield Area* (Appendix E-3 of this report).

Alternatives 2, 3, and 4 were eliminated from further consideration based on a variety of reasons, as summarized in Table 3-7. The alignments in these initial alternatives pass directly through the Flying J Refinery along the BNSF right-of-way. The freight rail right-of-way is narrow in this area and would not allow HST tracks to share the constrained right-of-way. In addition, gas pipelines parallel and pass under the right-of-way, posing obstacles for construction and the possibility of encountering fuel leaks and contaminated soil. The Technical Team conducted a risk assessment of HST operation through an active refinery and concluded that the proximity of the trains to refinery facilities that could release toxic gases or cause explosions could not be adequately mitigated to minimize risk to the passing trains and their riders. The risk assessment also cautioned that sparking from the trains' overhead power lines could ignite a gas release, causing an explosion. For these reasons, the aforementioned alternatives were not carried forward.

The Authority and FRA identified the following alternatives for further evaluation in the alternatives analysis:

- Alternative 1, Option 1A – Circumventing Refinery, Reduced Speed
- Alternative 1, Option 1D – Circumventing Refinery, Optimal Speed

Table 3-7. Bakersfield Subsection Evaluation of Initial Alternatives

Alternative	Evaluation	Carried Forward	Not Carried Forward
Program EIR/EIS Preferred Alignment	• Variations on program alignment reflected in Alternatives 1 and 2. Thus		
Alternative 1 5 options (A through E)	• All options avoid the Flying-J refinery by curving south of the refinery, paralleling the Westside Parkway right-of-way and becoming elevated to cross the BNSF yard with piers placed in a configuration that would not disrupt freight operating, storage, and maintenance activities. • Option 1A geometry allows a minimum operating speed of 190 mph to be maintained throughout the city. In some instances, the geometry allowed the design speed of 250 mph to be achieved. It also travels through vacant and underutilized land, thus avoiding substantial land use impacts between Kern River and SR 99, but at reduced operating speeds. • Options 1B and 1C were designed to avoid the refinery, but with a tighter radius curve, slowing operation to substantially less than called for by project design criteria. Eliminated because the alignments could not maintain reasonable operating speeds (slower than 120 mph) and produced substantial land use	Options 1A and 1D	Options 1B, 1C, and 1E

Table 3-7. Bakersfield Subsection Evaluation of Initial Alternatives

Alternative	Evaluation	Carried Forward	Not Carried Forward
	impacts. • Option 1D is the same as 1A, albeit with reduced operating speeds. • Option 1E maintains the design speed throughout its alignment, curving south of the refinery and then east along California Avenue, but not accessing a downtown station. Eliminated due to displacement of businesses in the Bakersfield Plaza shopping center and Family Medical Plaza, the effect of an aerial structure on the visual setting of and access to Bakersfield High, and the displacement of two traffic lanes along California Avenue to accommodate the HST alignment. Also requires a second set of tracks that divert from California Avenue through the BNSF yard and around Bakersfield High to access the preferred station location.		
Alternative 2 3 options (A, B, and C)	• Most closely followed the path of the Program EIR/EIS Preferred Alignment without displacing civic building in the downtown area. Compared to Program EIR/EIS Preferred Alignment, the refined alignment maintained a faster—although not optimal—operating speed of 220 mph throughout the Bakersfield area. • All options travel along the BNSF corridor through the Flying-J refinery. • Option 2A could potentially affect Greenacres Park, a Section 4(f) property. Tracks are elevated to cross the BNSF yard with piers placed in a configuration that would not disrupt freight operating, storage, and maintenance activities. • Option 2B followed BNSF alignment at reduced speeds through the refinery and into downtown to access the downtown station. Eliminated because the curved track reduced operating speeds to 120 mph or less. • Option 2C maintains the design speed of 250 mph by deviating from the Program EIR/EIS Preferred Alignment and the BNSF right-of-way along wide-spaced curves that take the alignment though large sections of the Greenacres area and East Bakersfield. Displaces the most residential parcels of all the alternatives. Potentially the most expensive to construct, the most disruptive to residential neighborhoods, parks, and schools, and had the least favorable station placement.		Option 2A, 2B, and 2C
Alternative 3	• Similar to Alt 2, but used proposed roadway alignments of the Centennial Corridor east of the Kern River. • Eliminated because it could not maintain required speeds along this corridor without cutting through established residential communities.		Alt 3
Alternative 4	• Deviated substantially from the BNSF right-of-way to potentially reduce impacts and to maintain the design speed. Represented alignments that avoided the center of Bakersfield, taking advantage of the public right-of-way where possible, but not offering the opportunity for a downtown station. • Eliminated because it could not meet the purpose and need of providing a downtown station.		Alt 4

B. Detailed Description of Alternatives Carried Forward for Alternatives Analysis

For consistency across the subsections within the Fresno to Bakersfield Section, the alternatives carried forward were renamed. The new alignment names, along with their corresponding stations are described in Table 3-8 and illustrated in Figure 3-7**.**

Table 3-8. Bakersfield Subsection Alternatives Carried Forward to Alternatives Analysis

New Alternative Designation	Alignment	Original Alignment Name
D1-N	North of UPRR	Alternative 1, Option 1A – Circumventing Refinery, Reduced Speed (Blue Alignment)
D1-S	South of UPRR	Alternative 1, Option 1A – Circumventing Refinery, Reduced Speed (Blue Alignment)
D2-N	North of BNSF in Central Bakersfield	Alternative 1, Option 1D – Circumventing Refinery, Optimal Speed (Red Alignment)
D2-S	Over BNSF in Central Bakersfield	Alternative 1, Option 1D – Circumventing Refinery, Optimal Speed (Red Alignment)

Alternative D1-N: North of UPRR

The geometry of Alternative D1 allows an operating speed of 220 mph to be maintained throughout the subsection. The two-track, elevated HST alignment follows the eastern side of the BNSF right-of-way at-grade into the city from the north, passing over Hageman Road and Rosedale Avenue and remaining elevated as it deviates from the BNSF right-of-way along Enger Street. The alignment crosses over the BNSF right-of-way, Palm Avenue, and Calloway Drive on an elevated structure approximately 60 feet above grade, displacing residential and industrial uses, and traversing the site of the proposed Bakersfield Commons development.

The elevated, two-track alignment travels over the planned Coffee Road/Brimhall Road interchange and remains elevated over the Westside Parkway right-of-way immediately south of the Flying J Refinery. East of Coffee Road, the alignment straddles the Westside Parkway right-or-way for more than 2,000 feet. The alignment continues skirting the refinery, avoiding all refinery facilities. It ascends on a bridge structure, attaining 64 feet in height above grade to cross the Mohawk Street Extension, the Kern River, SR-99, and Oak Street. At its highest elevation, the bridge structure is 32 feet above SR-99.

The bridge passes over the northern edge of the Bakersfield Plaza shopping center where commercial buildings abut the BNSF right-of-way before traversing the BNSF yard on an elevated structure. Yard track within the BNSF yard may have to be relocated to accommodate the HST alignment. On the eastern end of the BNSF, just north of 14th Street, the alignment transitions to a four-track elevated structure approximately 100 feet wide along the northern edge of the Bakersfield High School campus. The Industrial Arts building at Bakersfield High and several commercial structures that border the BNSF right-of-way on the south would be displaced. The four-track alignment transitions from the blocks immediately south of the BNSF right-of-way to directly over the BNSF right-of-way at N Street, entering the HST station area immediately south of the existing Amtrak station. The elevated station platform would extend approximately 1,380 feet over the BNSF right-of-way from the Amtrak station bus bays to V Street, and be linked by station site design with the Amtrak station, Truxtun Avenue, and the Mill Creek Redevelopment Area immediately to the south.

To the east of the station, the elevated alignment diverts from the BNSF right-of-way east of Union Avenue and parallels East Truxtun Avenue on the north through commercial and industrial uses. The alignment narrows to two tracks on elevated structure at Baker Street, continuing over the UPRR right-of-way on a massive structure 50 feet above-grade span the eastern end of the Kern Junction yard at

Washington Street. The skewed angle of the structure may require support piers to be located within the UPRR right-of-way. The alignment would parallel the UPRR right-of-way immediately to the north, traversing land uses that are primarily residential parcels. To remain elevated adjacent to the UPRR right-of-way, the alignment would need to span the overpasses at Mount Vernon Avenue and Oswell Street, approximately 50 to 60 feet above grade, and 32 feet above the overpasses.

Alternative D1-S: South of UPRR

Alternative D1-S has the same alignment description as Alternative D1-N from Hageman Road in Rosedale to the HST station in downtown Bakersfield, including traversing and displacing BNSF yard track, as well as the Industrial Arts building at Bakersfield High. As under Alternative D1-N, the HST platforms are elevated above the BNSF mainline at the Amtrak station. East of the station, the alignment mimics the path of Alternative D1-N as it skirts the edge of East Bakersfield along East Truxtun Avenue. However, unlike Alternative D1-N, this alternative curves south of East Truxtun Avenue, maintaining the four-track elevated configuration as it bends southeast to parallel Edison Highway along its southern right-of-way boundary. The alignment transitions to two tracks and comes to grade east of Mount Vernon Avenue. The two-track alignment continues under Oswell Street, where the Fresno to Bakersfield section ends.

Each overpass would require reconstruction to allow sufficient space to accommodate HST. The commercial, industrial, and residential uses that abut Edison Highway between Mount Vernon and Oswell Street would be affected by HST construction. Edison Highway may have to be redesigned to maintain its connection with the local street grid and to provide sufficient right-of-way to accommodate HST. The redesign of Edison Highway and impacts to adjoining uses may also require examining an above-grade profile that crosses above the overpasses of the UPRR in this area.

Alternative D2-N: North of BNSF in Central Bakersfield

The geometry of Alternative D2 allows HST to maintain 220 mph throughout the Subsection. The two-track, 60-foot HST alignment is adjacent to the eastern side of the BNSF right-of-way at-grade into the city from the north passing over Hageman Road and Rosedale Avenue, where it begins to deviate from the BNSF right-of-way. The alignment becomes elevated as it traverses the Greenacres neighborhood north of the BNSF right-of-way along Enger Street, and crosses over the BNSF right-of-way and Palm Avenue on an elevated structure 60 feet above grade, displacing residential and industrial uses and traversing the site of the proposed Bakersfield Commons development. The elevated, two-track alignment travels over the planned Coffee Road/Brimhall Road interchange and remains elevated as it crosses over the Westside Parkway right-of-way on a 200-foot-long structure immediately south of the Flying J Refinery.

As the alignment approaches the Kern River, it transitions to a bridge structure (attaining 64 feet in height above grade and 32 feet over SR-99 at its highest elevation) that crosses the Mohawk Extension, Kern River, SR-99, Oak Street, and the BNSF tracks. Unlike Alternative D1, Alternative D2-N avoids the Bakersfield Plaza shopping center and commercial buildings adjacent to the BNSF right-of-way. East of Oak Street, the elevated alignment crosses over the BNSF mainline and yard tracks on a skewed angle to parallel the BNSF right-of-way on the north. As it travels along the underused blocks north of the BNSF right-of-way, the alignment widens to a four-track elevated structure approximately 100 feet wide at B Street. Few structures are displaced by the alignment in this area, although it is located near Mercy Hospital.

The elevated alignment crosses back to the southern side of the BNSF right-of-way at M Street, immediately west of the Convention Center. The four-track alignment enters the HST station area on a trajectory that intrudes into the Mill Creek Redevelopment Area south of the existing Amtrak station and east of P Street. Unlike the station configuration for Alternative D1, the elevated station platform (approximately 1,380 feet long) is south of the BNSF right-of-way opposite the Amtrak station and

extends from Q Street to east of S Street. The station would require integration and coordination with the City's redevelopment plans at Mill Creek.

East of the station area, the alignment transitions from four tracks to two tracks on elevated structure near Kern Street, traversing industrial and residential uses north of Alpine Street before entering the median of California Avenue near Beale Avenue. A church located along California Avenue at this location may be affected by HST construction. From Beale Avenue east, the median of California Avenue would be expanded to contain support piers for the elevated two-track structure, and the roadway would be restriped. Approaching Edison Highway, the alignment bends southeast at Quantico Avenue to parallel Edison Highway on the south, as described for Alternative D1-S. The alignment transitions to a two-track, at-grade alignment at Oswell Street, continuing under Oswell Street, Fairfax Road, and Morning Drive, all of which cross over Edison Highway and the UPRR right-of-way. Each overpass would require reconstruction to allow sufficient space to accommodate HST.

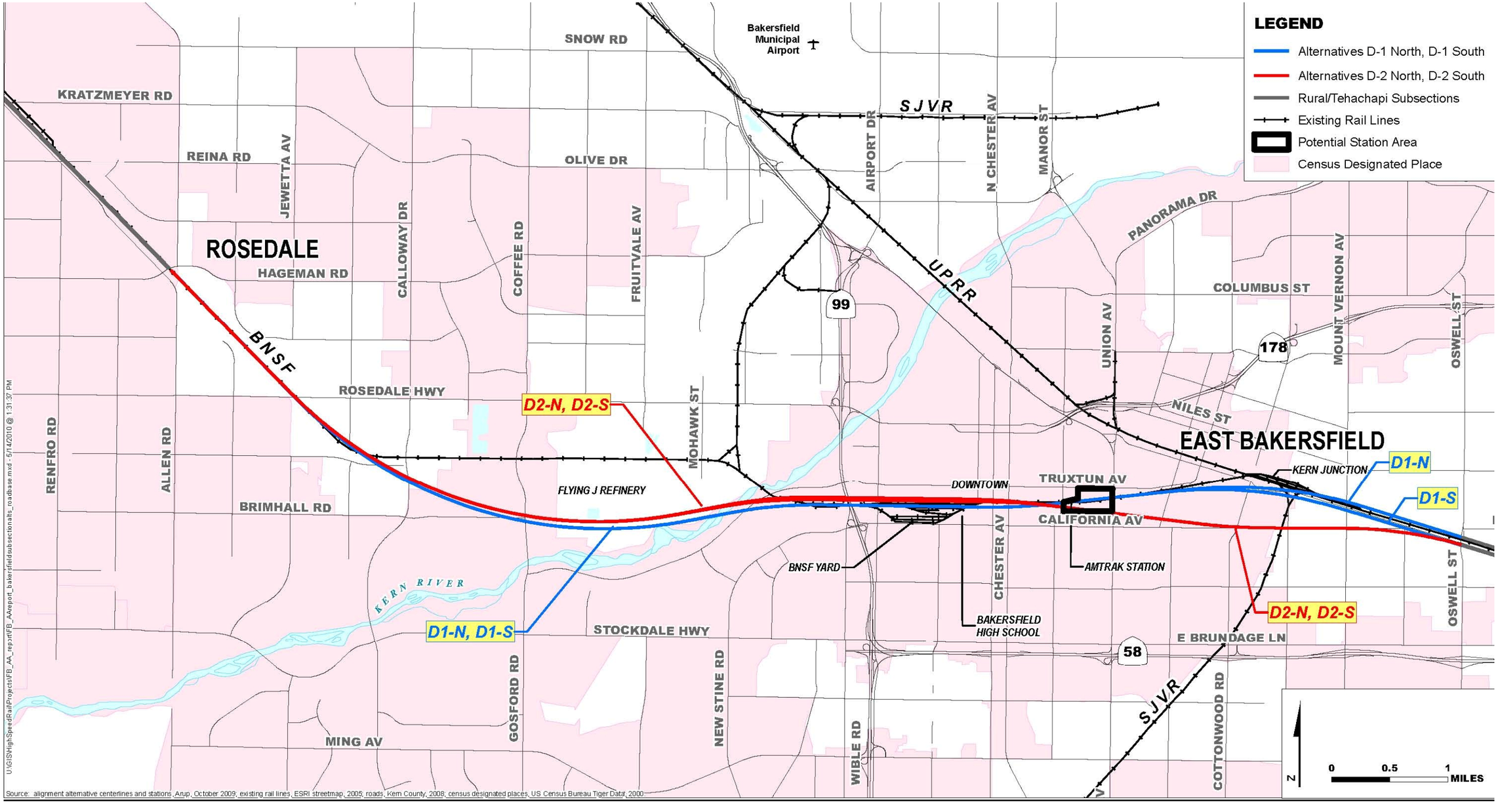
The commercial, industrial, and residential uses that abut Edison Highway between Mount Vernon and Oswell Street would be affected by HST construction. Edison Highway may have to be redesigned to maintain its connection with the local street grid and to provide sufficient right-of-way to accommodate the HST. The redesign of Edison Highway and impacts to adjoining uses may also require examining an above-grade profile that crosses above the overpasses of the UPRR in this area. The Fresno to Bakersfield Section ends at Oswell Street.

Alternative D2-S: Over BNSF in Central Bakersfield

The alignment for Alternative D2-S enters Bakersfield area east of the BNSF right-of-way and circumvents the refinery, then crosses the Kern River and SR-99 as described for Alternative D2-N. Unlike Alternative D2-N, this alignment may affect commercial buildings located along the southern perimeter of the BNSF right-of-way at Bakersfield Plaza. Instead of crossing over the BNSF, Alternative D2-S enters the BNSF right-of-way on an elevated structure at Oak Street. The alignment continues above the BNSF mainline track as it passes through Central Bakersfield, likely requiring track relocation to accommodate the elevated structure.

The alignment transitions to a four-track elevated structure approximately 100 feet wide over the BNSF right-of-way east of D Street. Support piers for the four-track alignment may extend beyond the BNSF right-of-way, affecting adjacent land uses, including the Industrial Arts building at Bakersfield High, on either side of the right-of-way between D and M Streets. The alignment begins to slant south of the BNSF right-of-way as it approaches R Street and the HST station area. The elevated station platform, which intrudes into the northern edge of the Mill Creek Redevelopment Area south of the existing Amtrak station, is aligned on the same tangent as for Alternative D2-N (see Figure 3-7). As under Alternative D2-N, the alignment transitions from four tracks to two tracks on elevated structure near Kern Street, traversing industrial and residential uses north of Alpine Street and a church property before entering the median of California Avenue near Beale Avenue. The alignment continues along California Avenue and Edison Highway to Oswell Street, as described for Alternative D2-N.

Figure 3-7. Bakersfield Subsection – Alternatives Retained for Detailed Analysis



3.4. Agency Coordination and Public Outreach

3.4.1. Scoping Meetings

Five public scoping meetings were held for the Fresno to Bakersfield Corridor between March 18 and March 26, 2009, which were attended by a total of 400 people. The Authority and FRA received a total of 188 comments from individuals and organizations. During the public review period for the NOP/ NOI for the Fresno to Bakersfield section, between September 29, 2009 and October 30, 2009, no individual comments were received from private citizens. Following are summaries of the comments provided in conjunction with the scoping meetings.

A number of commenters noted the benefits of HST, including economic benefits and jobs, air quality improvement, traffic congestion relief, and energy conservation. Primary environmental concerns related to noise and aesthetics. A number of commenters expressed concern about the level of noise the trains may generate and how sensitive receptors will be identified. Several commenters recorded concerns about aesthetics.

Other environmental concerns mentioned in the comments included dust control, conversion of agricultural land, potential impacts on historic structures, hazardous spills, and growth inducement.

Commenters expressed concern over transportation impacts due to HST crossings of roads and the potential to block roads and intersections. Concerns regarding displacement of residents and devaluation of property were also expressed. One commenter noted the familial and cultural connections between the rural communities of Malaga, Easton, Caruthers, Fowler, Selma, Hanford and Riverdale and the need to maintain access between them. A number of comments concerned economic issues, including cost and financing of the system, use of U.S. labor and U.S. products, economic growth potential, benefits and impacts on local businesses, and employment opportunities.

A citizen's group advocating rail consolidation around Fresno advocated an HST express route to the west of Fresno, along with relocation of the UPRR tracks and the UPRR Fresno yard. They expressed concerns that HST express service through downtown Fresno would create noise and construction-related disruption, whereas a western alignment and relocation of the UPRR would have safety advantages, cause less disruption to freight service, and provide an opportunity for locating the maintenance facility at the UPRR rail yard in central Fresno. Other commenters also expressed support for these positions.

Representatives of UPRR submitted comments as part of the HST project scoping process, noting a variety of technical issues, including noting that the UPRR right-of-way varies in width through the Fresno to Bakersfield corridor. UPRR stated their belief that shared use of its track would not be feasible. They stated that, for safety reasons, there should be a 200-foot separation between freight trains and HST trains (UPRR, 2009)

3.4.2. TWG and PIM Meetings

For each of the subsections, the Authority held several types of outreach meetings. These meetings included Technical Working Group (TWG) meetings. The TWGs consisted of senior transportation, planning, and public works staff representing state and local agencies in the HST corridor. To form the TWGs, the Authority worked with local stakeholders to form technical working groups (TWGs) to serve as liaisons to the HST project.

After the formal environmental scoping period ended, the Authority hosted several public information meetings (PIMs) throughout the Fresno to Bakersfield Section.

The dates of outreach meeting are listed in Table 3-9

More detail of comments received at the meetings is provided in Appendix C.

Table 3-9. Outreach Meetings

Subsection	Meeting Date	Purpose
Fresno	July 7, 2009	Technical Working Group
Fresno	August 12, 209	Technical Working Group
Fresno	September 22, 20090	Technical Working Group
Fresno	January 19, 2010	Public Information Meeting
Fresno	March 15, 2010	Public Information Meeting
Rural	July 1, 2009	Technical Working Group
Rural (Hanford)	April 27, 2010	Public Information Meeting
Rural (Wasco)	May 5, 2010	Public Information Meeting
Rural (Corcoran)	May 5, 2010	Public Information Meeting
Bakersfield	May 14, 2009	Technical Working Group
Bakersfield	June 16, 2009	Technical Working Group
Bakersfield	September 15, 2009	Public Information Meeting
Bakersfield	December 4, 2009	Public Information Meeting
Bakersfield	December 9, 2009	Public Information Meeting

3.4.3. Visalia-Tulare-Hanford Station Feasibility Study Outreach

In conjunction with the Visalia-Tulare-Hanford Station Feasibility Study, which concluded in August 2007, the Authority conducted a comprehensive outreach among communities along the alignment. The outreach consisted of two components. First, the project team contacted local government staff involved in transportation and planning within the study area or who were otherwise involved in the earlier Statewide Program EIR/EIS. These initial meetings led to follow-up communications with these communities and the identification of other groups or agencies to contact, including agricultural groups who identified how best to assess impacts to agriculture. The second component of the outreach process consisted of two types of meetings. The first series of meetings were with agency staff, decision-makers, and members of the public to inform them of the project, gain their knowledge of the area, and learn about important individuals and organizations the project team should include in its outreach efforts. The second type of meetings held were with two Technical Assessment Groups (TAGs) that were organized to provide focused regional input. One TAG consisted of representatives from cities and organizations within Fresno County. The other TAG was composed of representatives within Tulare and Kings Counties and representatives from Corcoran and McFarland in Kern County.

Team members met, either on an individual basis or in groups, with agency staff directors, planners, and managers throughout the project study area to explain the purpose of the study, obtain information on local issues and ideas, and identify other individuals or organizations to meet with to discuss the project. Through this process, the project team was able to gain valuable insight on the needs of each of the communities, background data and history of their communities, and unique or important areas for the HST to avoid. These meetings enabled the team to assemble the two TAGs that provided input for all communities within the study area in a collaborative setting.

Two well-attended meetings were held individually with each TAG to obtain initial input to the study team and to provide the team with expert local knowledge, then to obtain feedback on initial study results. A final joint TAG meeting was held to present the results of the study and obtain input on its findings. The Fresno TAG meetings were held at the Council of Fresno County Governments' offices in downtown Fresno. The Kings/Tulare TAG meetings and the joint TAG meeting were held at the Visalia Convention Center in Downtown Visalia.

3.4.4. Other Stakeholder Outreach

In addition to the outreach efforts described above, the Authority met with local officials in several public meetings. These included the following meetings:

- Joint meeting of the Corcoran Planning Commission and Economic Development Commission on November 09, 2009;
- Fresno County and the Kern County Agriculture and Water committees on April 15, 2010
- Kings County Board of Supervisors Agricultural Advisory Committee on April 14, 2010
- Kings County Planning Commission on May 3, 2010
- Kings County Board of Supervisors on May 3, 2010.

At these meetings, Authority representatives provided project updates and responded to questions concerning the project.

The Authority has also continued to meet with landowners and other interested parties, including a meeting in Hanford with Kings County landowners on April 8, 2010, and in Fresno with the Nisei Farmers League on April 19, 2010.

The Outreach Summary Report for the Fresno to Bakersfield Section is included in Appendix C-1.

4.0 EVALUATION OF ALTERNATIVES

This section of the Alternatives Analysis Report focuses on the evaluation of the alternatives and options carried forward from the Initial Alternatives Discussion according to the Authority's Technical Memo *Alternatives Analysis for Project* EIR/EIS (Appendix A). In addition, after further study and refinement, several additional alternatives have been introduced and evaluated as a part of the Alternatives Analysis; the evaluations of all alternatives are described in this section. The evaluation of alternatives is based on alternatives/options as developed to date. As these are further defined, some of the specific information in this report may change.

Throughout this report, the term "alternatives" describes end-to-end alignments (with or without stations) that traverse an entire subsection, such as from Clinton Avenue in the north of Fresno to approximately South Avenue in southern Fresno, or, for the Rural Subsection, from South Avenue in Fresno to Hageman Road in Bakersfield. The term "options" refers to local variations within an alternative, such as through a town or a bypass around a town. Both alternatives and options were evaluated against the criteria outlined in Section 2 to determine which alternatives and options should be carried forward for a detailed evaluation in the EIR/EIS.

4.1. Fresno Subsection

The Fresno Subsection begins at the end of the Merced to Fresno Section at Clinton Avenue in Fresno, approximately three miles north of the Fresno station location. The Fresno Subsection ends near E. Manning Avenue in Fresno, where to meets the Rural Subsection.

The evaluation of alternatives for the Merced to Fresno Section (north of Clinton Avenue) are described in the *Preliminary Alternatives Analysis Report for the Merced to Fresno Section.*

4.1.1. Alternatives Considered

The alternatives and options covered by this analysis consist of those carried forward from the Initial Alternatives discussion (see Section 3.0). As shown in Table 4-1 and described in Section 3.0, each alternative reflected a combination of a horizontal alignment through central Fresno; a vertical profile; and a route to connect to the Rural Subsection.

Table 4-1. Fresno Subsection – Alignment Alternatives Considered

Alternative	Horizontal Alignment	Vertical Profile	Connection with Rural Subsection
B1	UPRR West	Elevated	BNSF
B2	UPRR East	Elevated	BNSF
B3	Golden State Blvd	Elevated	BNSF
B4	UPRR West	Elevated	UPRR
B5	UPRR East	Elevated	UPRR
B6	Golden State Blvd	Elevated	UPRR
B7	UPRR West	Mixed At-Grade/Elevated	BNSF
B8	UPRR East	Mixed At-Grade/Elevated	BNSF
B9	Golden State Blvd	Mixed At-Grade/Elevated	BNSF
B10	UPRR West	Mixed At-Grade/Elevated	UPRR
B11	UPRR East	Mixed At-Grade/Elevated	UPRR

Table 4-1. Fresno Subsection – Alignment Alternatives Considered

Alternative	Horizontal Alignment	Vertical Profile	Connection with Rural Subsection
B12	Golden State Blvd	Mixed At-Grade/Elevated	UPRR
B13	UPRR West/UPRR East Crossover	Elevated	BNSF

One alternative (B13) was defined as a combination of Alternatives B1 (UPRR West) and B2 (UPRR East).

4.1.2. Evaluation

Consistent with the evaluation process outlined in Section 2.0, the alternatives were assessed against the project objectives and evaluation criteria. The resulting findings were then used to determine which alternatives would be carried forward into preliminary engineering design and environmental review as part of the EIR/EIS.

To facilitate comparison of the alternatives under consideration, the Fresno Subsection was divided into three geographic areas: North of Downtown (Clinton Avenue to SR-180); Downtown (SR-180 to SR-41); and South of Downtown (SR-41 to the connection with the Rural Subsection). Following are summary of evaluations of different groupings of alternatives within each of these geographic areas. These summary evaluations draw upon the more detailed analyses presented in Table 4-2 and Table 4-3, beginning on page 4-12.

A. North of Downtown (Clinton Avenue to SR-180)

Within the area between Clinton Avenue to the north and SR-180 to the south, three key resources influenced the evaluation of alternatives : Roeding Park; SR-180; and the San Joaquin Valley Railroad.

- **Roeding Park** – All alternatives based on UPRR West or Golden State Blvd (B1, B3, B4, B6, B7, B9, B10, and B12) encroach on the eastern margin of Roeding Park. The extent of encroachment is determined by the location of the centerline of HST tracks, the number of tracks in the cross section at Roeding Park (2 or 4), and the disposition of Golden State Boulevard (i.e., maintained in its current four-lane configuration or narrowed).

  The impacts of the HST on Roeding Park also differ between the elevated- and at-grade alternatives, including potential conflicts with planned expansion of Fresno's Chaffee Zoo. In 2004, Fresno voters passed Measure Z, a local sales tax that generates revenues to fund the zoo's expansion. The $150 million project is currently pending certification of an EIR. The project would approximately double the acreage of the zoo, expanding it eastward almost to Golden State Boulevard. The zoo's master plan also states that new access to Roeding Park and Chaffee Zoo would be provided from Golden State Boulevard.

  Roeding Park is a Section 4(f) and Section 6(f) property, so any project that would affect the park is subject to following provision of federal law:

  > Under Section 4(f) if there is a feasible and prudent alternative that avoids the use of a Section 4(f) resource, among alternatives that use a Section 4(f) resource, the alternative that must be selected is the one that avoids the Section 4(f) resource.[1]

[1] From the Federal Highway Administration Section 4(f) Policy Paper, March 1, 2005. Section 4(f) applies to the actions of agencies within the U.S. Department of Transportation and includes the Federal Railroad Administration.

The determination of "feasible and prudent" alternatives is based upon a standard found in the Federal Highway Administration Section 4(f) Policy Paper (2005). An alternative is considered feasible if it is technically possible to design and build that alternative. An alternative may be rejected as not prudent for any of the following reasons:

- It does not meet the project purpose and need;
- It involves extraordinary operational or safety problems;
- It presents unique problems or truly unusual factors;
- It results in unacceptable and severe adverse social, economic or other environmental impacts;
- It would cause extraordinary community disruption;
- It has additional construction costs of an extraordinary magnitude; or
- There is an accumulation of factors that collectively, rather than individually, have adverse impacts that present unique problems or reach extraordinary magnitudes.

A Section 4(f) evaluation is required for any project receiving federal Department of Transportation funds. In addition, Roeding Park has received funding for park improvements that qualify it for protection as a Section 6(f) resource. Any conversion of use from the 6(f) resource may require special approval and compensation/mitigation.

- **State Route 180** – All of the at-grade alignment alternatives would require passing below SR-180 to the north of downtown Fresno. At SR-180, both the UPRR West and Golden State Boulevard alternatives would be in conflict with the earthen embankment that brings SR-180 to elevation for its crossing over the UPRR main line. Keeping the HST alignment at grade would require major reconstruction of the SR-180 overcrossing and adjacent streets. The UPRR East at-grade alternatives may be more easily constructed through the elevated Caltrans highway structures.

- **San Joaquin Valley Railroad (SJVR)** – All at-grade station alternatives would sever existing connections between both the UPRR or BNSF and the SJVR.

Other impacts of specific alignment alternatives are described below .

Alternatives B1, B3, B4, and B6 (UPRR West and Golden State Boulevard Elevated)

Olive and McKinley avenues would be grade-separated over the HST alignment and extended over the adjacent UPRR tracks, realigned Golden State Boulevard, and Weber Avenue. To maintain access from Olive or McKinley avenues to Golden State Boulevard and Weber Avenue, an elevated interchange would need to be constructed with ramps to the realigned Golden State Boulevard and Weber Avenue.

Adjacent to Roeding Park, a realigned Golden State Boulevard would encroach approximately 130 feet into Roeding Park (see Figure 4-1 and

Figure 4-2). To mitigate this impact, either of the HST alignments west of UPRR could be placed on elevated structures approximately 60 feet high at the top astraddle and directly above the existing Golden State Boulevard. This would reduce the lateral impact to Roeding Park, as shown inFigure 4-3 and Figure 4-4, but would extend the length of the aerial structure through the park. Alternatively, Golden State Boulevard could be realigned with a reduced width of roadway as shown on Figure 4-5.

Figure 4-1. HST Elevated Adjacent to Roeding Park, Adjacent to Golden State Boulevard – Looking North

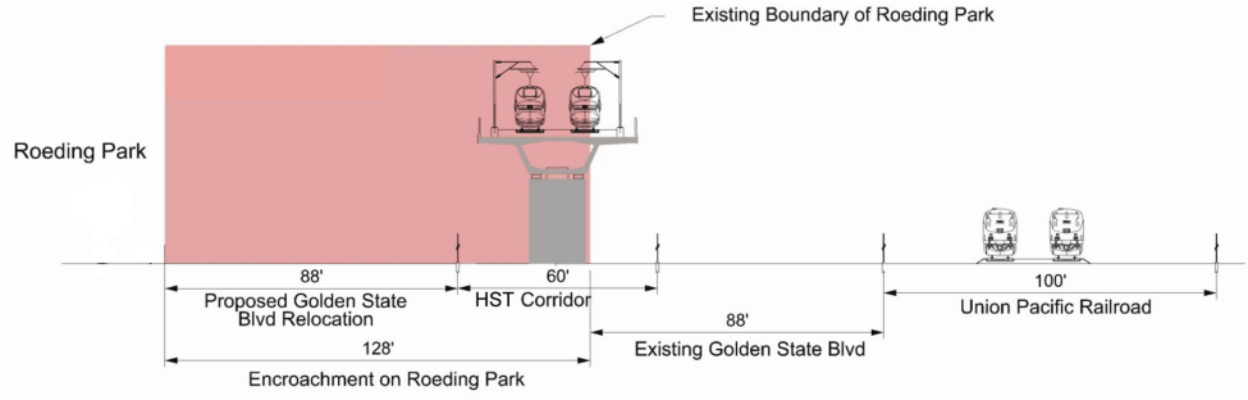


Figure 4-2. Potential Impacts to Roeding Park-At-Grade Alternatives

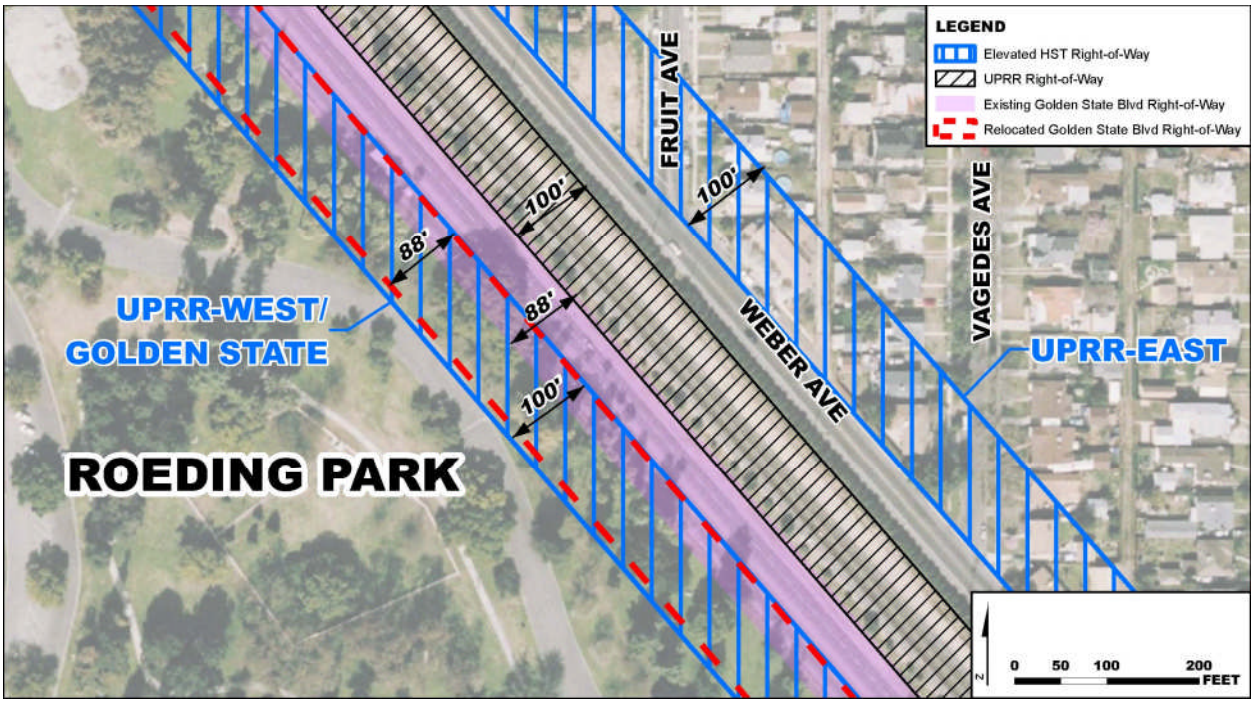


Figure 4-3. Potential impacts to Roeding Park-Elevated Alternatives

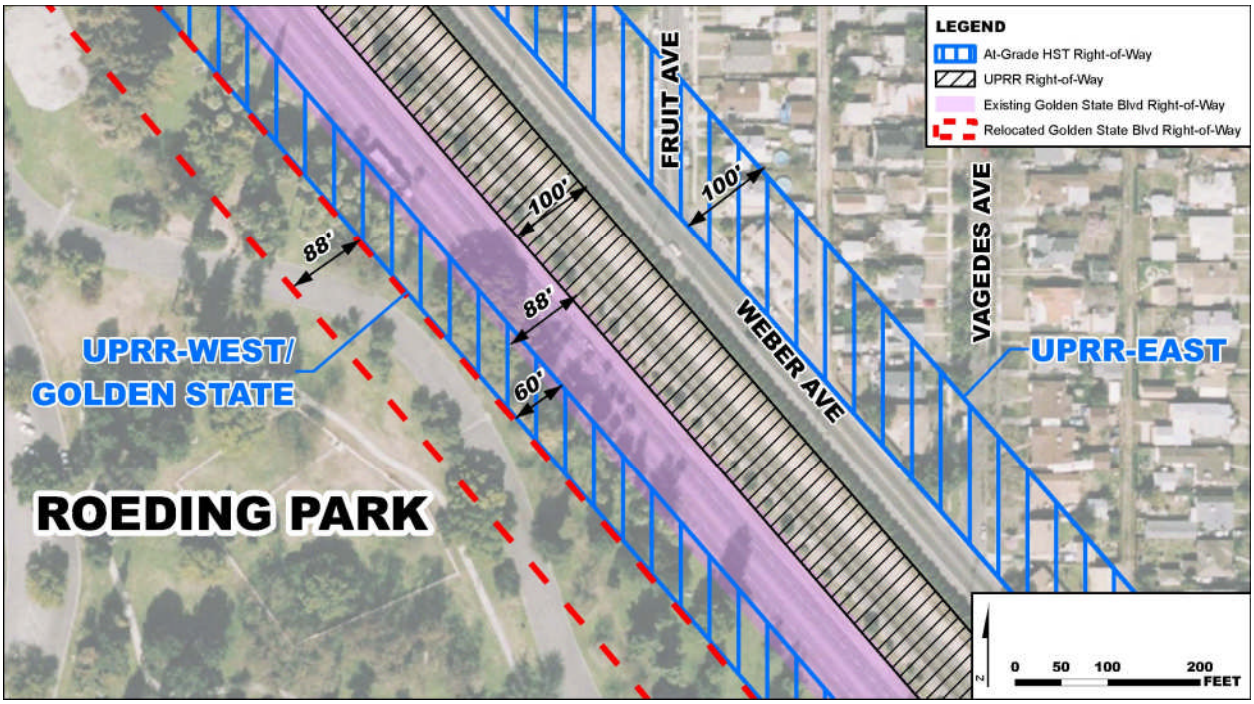


Figure 4-4. HST Elevated Adjacent to Roeding Park, Above Golden State Boulevard – Looking North

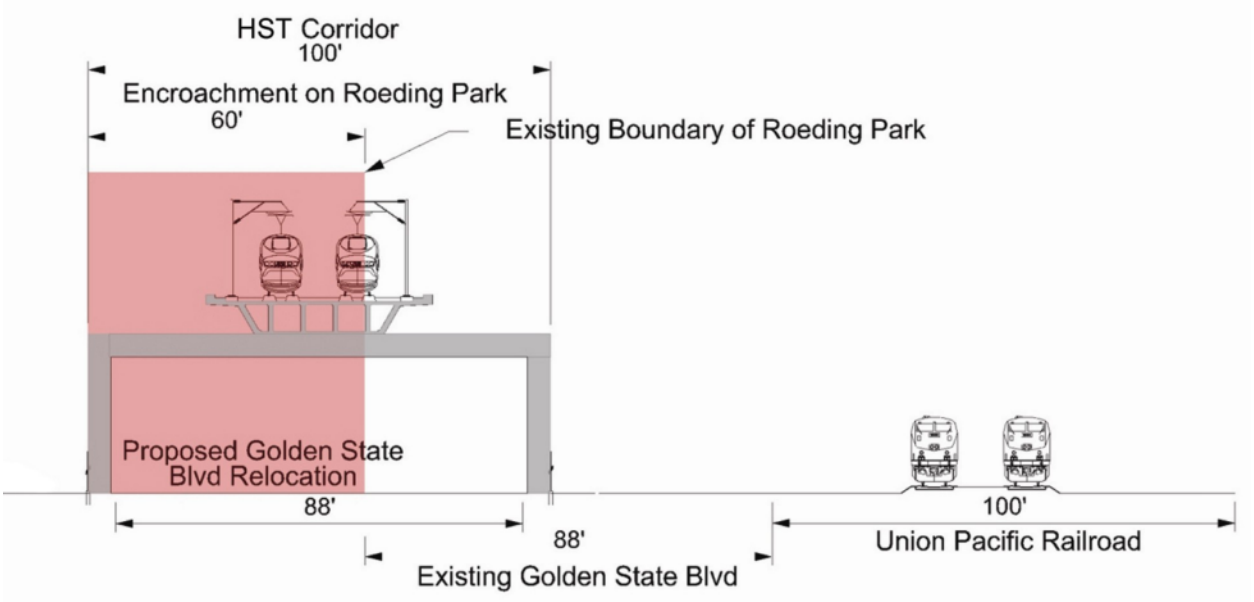
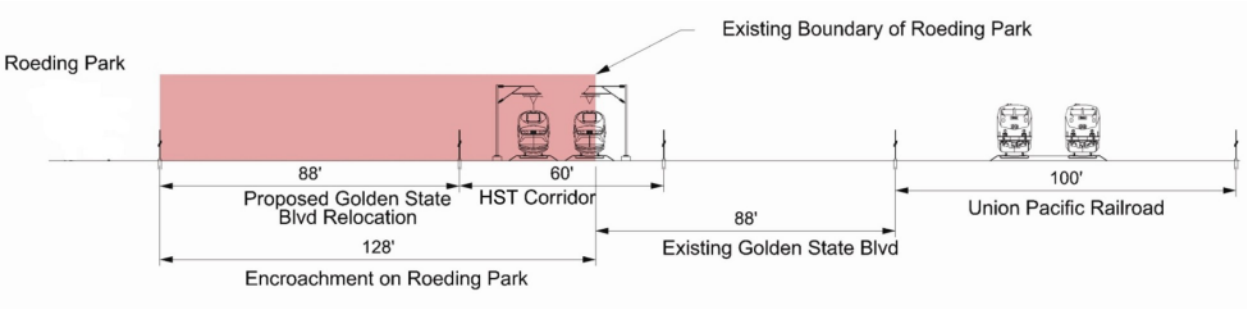


Figure 4-5. HST At-Grade Adjacent to Roeding Park, Reduced Width Adjacent to Golden State Boulevard – Looking North

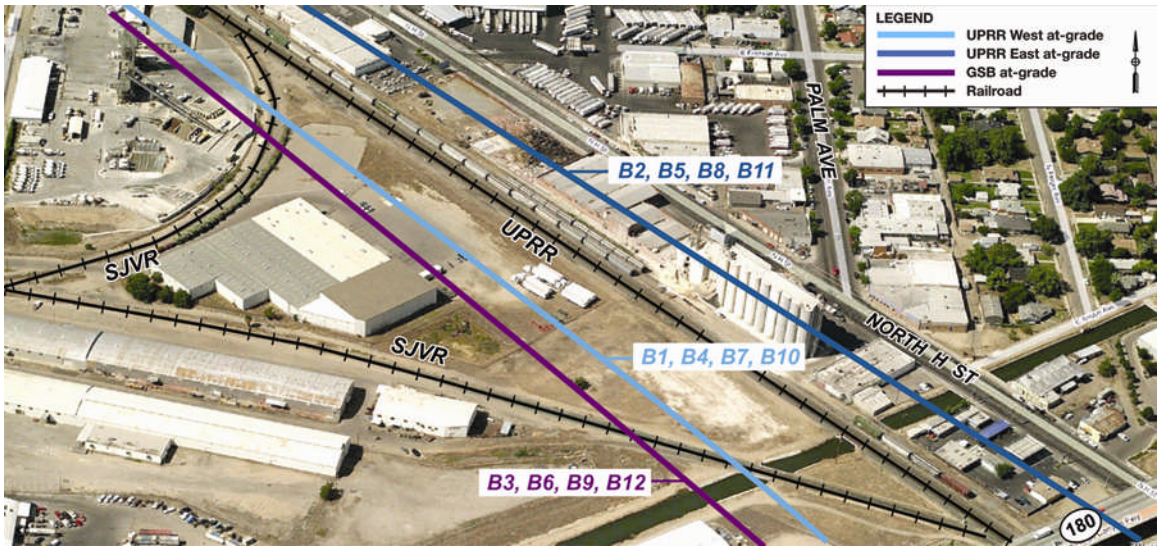


Alternatives B7, B9, B10, and B12 (UPRR West and Golden State Boulevard Mixed At-Grade/Elevated)

As with the elevated alternatives, these alignment alternatives would require realignment of Golden State Boulevard approximately 130 feet into Roeding Park, as shown on Figure 4-5. The greatest impact on the park would be imposed by the four-track cross section of the Golden State Boulevard HST at-grade alternative (B9).

Figure 4-6 shows how the UPRR West and Golden State Boulevard at-grade alignment alternatives would sever the existing connection to the SJVR from the UPRR.

Figure 4-6. San Joaquin Valley Railroad Connections



Alternatives B2, B5, B8, and B11 (UPRR East Elevated or At-Grade)

Running south from Clinton Avenue, the alignments would cross over the UPRR right-of-way, requiring a 3,500-foot structure north of Roeding Park. This would be a complicated construction, particularly if disruption to the UPRR is to be minimized.

None of these options would require taking any land from Roeding Park.

North Weber Avenue would either have to be realigned to the east of the HST right-of-way onto residential land or closed, with the existing traffic redirected.

B. Downtown (SR-180 to SR-41)

Within the area between SR-180 to the north and SR-41 to the south, two key resources influenced the evaluation of the alternatives: the Historic Southern Pacific Depot and Chinatown.

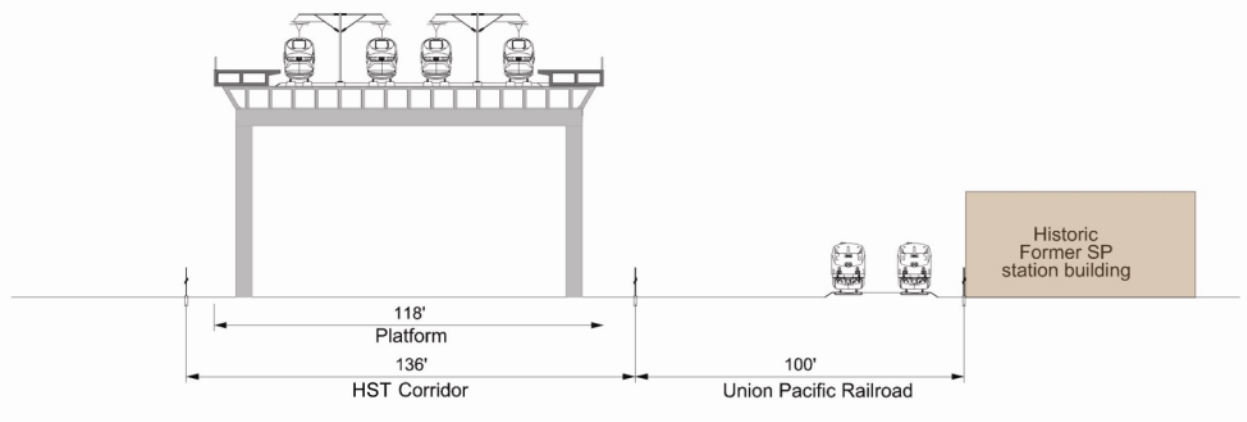
- **Historic Southern Pacific Depot** – The Historic Southern Pacific Depot, which is listed on the National Register of Historic Places (NRHP), would be displaced by all UPRR East alternatives (B2, B5, B8, and B11).
- **Chinatown Historic Properties** – Two locally listed historic properties (the Bing King Association Building at 921 – 929 China Alley and the Bow On Tong Association Building at 935 China Alley) could be adversely affected by the Golden State Boulevard alternatives (B3, B6, B9, and B12). These buildings could also be considered Section 4(f) properties if they are determined to be eligible for listing in the NRHP and if federal funds are used for the HST project.

Other impacts of specific alignment alternatives are described below.

Alternatives B1 through B6 (Elevated)

Each of these elevated alternatives through Downtown Fresno would have similar impacts, varying according to the specific properties affected. They would all pass over most existing features (Figure 4-7), and their principal disruption would be caused by construction.

Figure 4-7. HST Elevated Station West of UPRR – Looking North



The amount of land required for construction of the guideway structure would be similar to that required for the at-grade station alternatives, but much of the land could be re-used after completion, including for station facilities and parking. The Golden State Boulevard alternatives would be partially elevated above G Street, which would complicate their construction.

Both alternatives would displace the historic Southern Pacific depot building and Pullman sheds immediately to the east of the UPRR right-of-way north of Tulare Street.

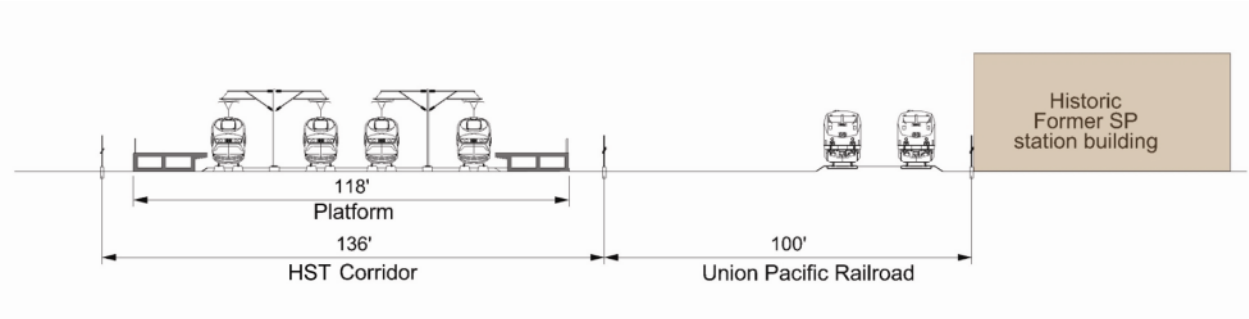
Alternatives B7 and B10 (UPRR West At-Grade)

Both of these alternatives would require reconstruction of existing SR-180 and SR-41 structures and connecting ramps, Stanislaus Street, Tuolumne Street, with attendant permanent and construction-related impacts. Stanislaus, Tuolumne, Divisadero, Fresno, Tulare, Mono, and Ventura Streets would all require grade separation or closure with attendant property access and circulation issues.

As shown on Figure 4-8**,** the 136-foot station and station track cross section through central Fresno would require acquisition of substantial amounts of property, as well as removal or relocation of existing

structures currently to the west of the railroad. Station buildings and associated infrastructure could add to this width.

Figure 4-8. HST At-Grade Station West of UPRR – Looking North



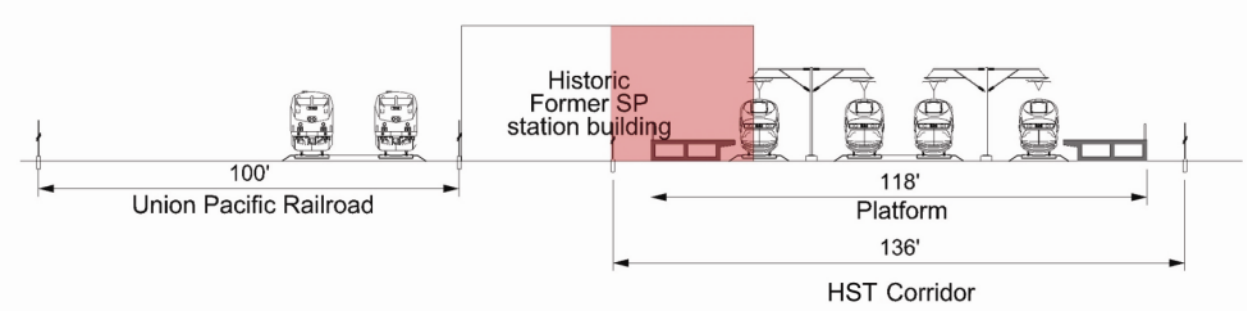
Alternatives B8 and B11 (UPRR East, At-Grade)

Alternatives B8 and B11 would have the same impacts on local and state transportation faculties as Alternatives B7 and B7 described above.

In addition, there would be substantial displacement of the existing light industrial buildings currently to the east of the railroad.

As shown in Figure 4-9 and Figure 4-10, the Historic SP Depot would be displaced by Alternatives B8 and B11. (The shaded area in the figure represents the portion of the building directly affected by the trackway and station platform configuration.)

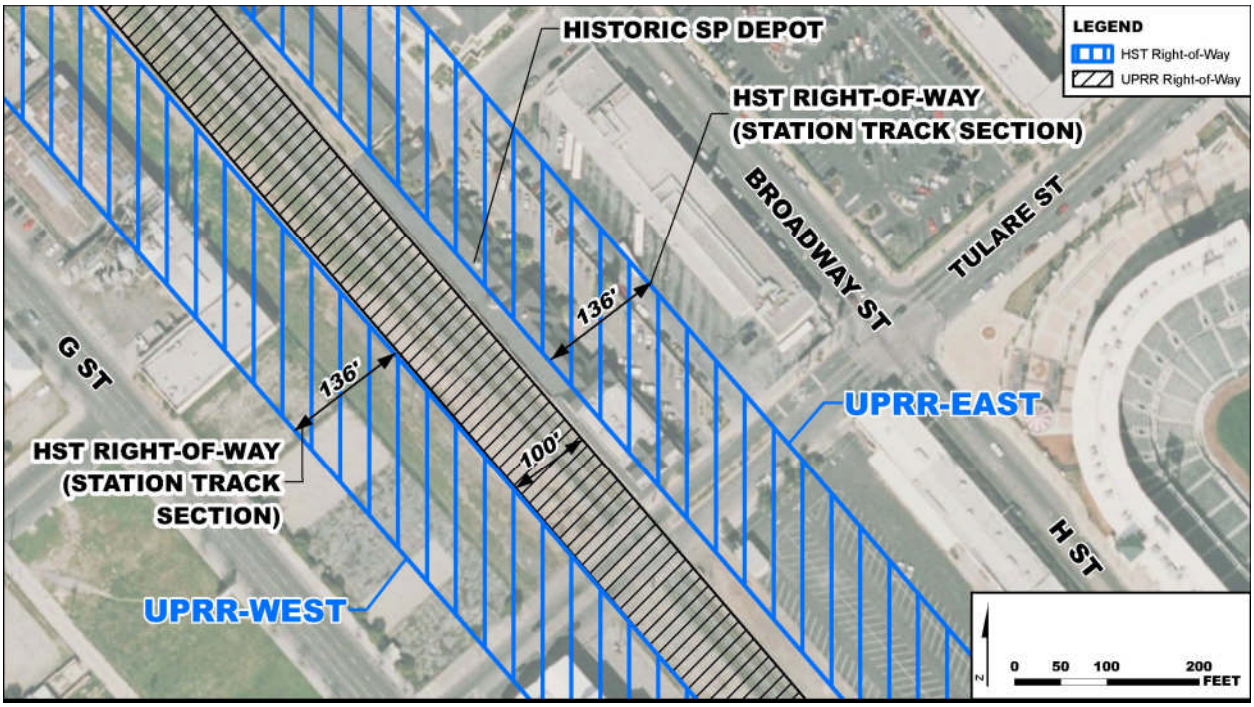
Figure 4-9. HST At-Grade Station East of UPRR – Looking North



Alternatives B9 and B12 (Golden State Boulevard At-Grade)

The Golden State Boulevard alternatives aligned along G Street in this area would intrude upon the surrounding neighborhood and disrupt the local street network. Grade separations or closures of Stanislaus, Tuolumne, Divisadero, Fresno, Tulare, Mono, and Ventura streets would be required. In most cases, these closures would be complicated by the proximity of existing buildings. There would be major land acquisition and associated structure demolition, predominantly of light industrial structures.

Figure 4-10. Potential Impacts to the Historic Southern Pacific Depot



C. South of Downtown (SR-41 to Beginning of Rural Subsection)

Within the area south of downtown Fresno, three key resources influenced the evaluation of the alternatives: BNSF Calwa Yard; SR-41; and the San Joaquin Valley Railroad. These features are described below and referenced in the evaluations that follow.

- **Calwa Yard** – Alternatives B5 and B11 would pas through the BNSF Calwa Yard, adding construction complexity and potential impacts to BNSF and UPRR operations. At this time, BNSF has not indicated whether it would allow the HST system to share its right-of-way in Fresno.

- **San Joaquin Valley Railroad (SJVR)** – All of the at-grade alignment alternatives would sever existing connections between both the UPRR or BNSF and the SJVR.

- **State Route 41** – All of the at-grade alignment alternatives would require passing below SR-41 to the south of downtown Fresno. At SR-41, the UPRR West and Golden State Boulevard alternatives would similarly require reconfiguration of the highway and ramp overcrossings and the adjacent streets. The UPRR East at-grade alternatives may be more easily constructed through the elevated Caltrans highway structures.

Alternatives B1 and B7 (UPRR West, BNSF to Rural Subsection)

Both alternatives would result in numerous displacements of existing light industrial uses. The HST alignment would cross Golden State Boulevard via an acute-angled overcrossing that may require special construction.

Under Alternative B7, grade separations or closures would be required for South Van Ness, Florence, Belgravia, Church, and Jensen avenues. These closures would be complicated by the proximity of Railroad Avenue and Golden State Boulevard on each side of the alignment. Jensen Avenue would likely require a full interchange to maintain the existing traffic flows. After crossing Jensen Avenue, the HST would ascend to a viaduct over Orange Avenue and Golden State Boulevard.

Alternatives B2 and B8 (UPRR East, BNSF to Rural Subsection)

Construction of the structure would necessitate some displacements of existing uses. The HST would cross the UPRR right-of-way from east to west at an acute angle, the aerial structure for which would require a lengthy series of straddle bents across the UPRR tracks.

Alternative B8 would be constructed at-grade along the eastern side of the UPRR right-of-way. Shortly after passing under SR-41, Alternative B2 would sever the SJVR connection to the eastern side of the UPRR right-of-way, as shown on Figure 4-11.

Figure 4-11. State Route 41 Crossing

Grade separation or closure would be required for South Van Ness and Florence avenues. After passing under Jensen Avenue, the HST would ascend to a viaduct over Church Avenue. From Church Avenue the impacts and the route would be the same as those for Alternative B2.

Alternatives B3 and B9 (Golden State Boulevard, BNSF to Rural Subsection)

Alternative B3 would have impacts similar to those of Alternative B1, described above.

Alternative B9 would run at-grade along the western side of the Golden State Boulevard right-of-way. A grade separation at Church Avenue and some minor local road realignments would be required. After crossing the Church Avenue, the HST would ascend to a structure over Jensen Avenue, Golden State Boulevard, and Orange Avenue.

Alternatives B4 and B10 (UPRR West, UPRR to Rural Subsection)

After passing over SR-41 on an elevated structure, Alternative B4 would descend to ground level to join Alternative B10. Both alternatives would encroach on light industrial properties and would require grade separation of Church and Jensen avenues. Jensen Avenue would likely require a new full interchange.

South of Jensen Avenue, both alternatives would require grade separations at Chestnut and Central Avenues, although they could be consolidated into a single crossing of the UPRR tracks.

Alternatives B5 and B11 (UPRR East, UPRR to Bakersfield)

South of Jensen Avenue, both alternatives would be elevated to pass over the adjacent UPRR and BNSF rights-of-way and through the existing BNSF Calwa Yard. The elevated structure would have a major

impact on the configuration and operation of the yard. Access and construction would be complicated in and around the two railroads' properties.

South of Calwa Yard and North Avenue, the alignment would descend to grade. Chestnut and Central avenues would require grade separation, although they could be consolidated into a single crossing of the railroad.

Alternatives B6 and B12 (Golden State Boulevard, UPRR to Rural Subsection)

South of SR-41, Alternative B6 would remain on an elevated structure about six miles long, extending from north of Roeding Park, across several local roads before passing over Jensen Bypass and Golden State Boulevard. Alternative B12 would pass under SR-41 and Jensen Bypass at grade and then ascend for a little over a mile to pass over Golden State Boulevard. Alternatives B6 and B12 would both encroach on light industrial properties.

From Golden State Boulevard, both alternatives would continue on a viaduct about a 1.2 miles long over North Avenue and the BNSF before descending to grade before Chestnut Avenue. Chestnut and Central avenues would require grade separation, although they could be consolidated into a single crossing of the railroad. The alignments would then run parallel to Golden State Boulevard and UPRR right-of-way at-grade. The alignment would ascend to pass over SR-99 before descending to grade and continuing to connect with the Rural BNSF route.

4.1.3. Recommendations for Fresno Subsection

As a first step in recommending alternatives to be carried forward, elevated and the mixed at-grade/elevated alternatives were compared (Table 4-2). Those alternatives relying on a mixed at-grade/elevated vertical profile would result in considerably greater problems than those relying on primarily elevated profiles. Many of the problems are related to the disruption resulting from being at grade, including interruptions to the street grid and associated traffic problems and severance of existing rail spurs. The at-grade construction would also be more complex because of the extensive roadway grade separations, utility relocations, right-of-way acquisition, and extended construction time.

Table 4-2. Fresno Subsection – Comparison of Elevated vs. Mixed At-Grade/Elevated Alternatives

Category	Measure	Elevated (B1, B2, B3, B4, B5, B6)	Mixed At-Grade/Elevated (B7, B8, B9, B10, B11, B12)
Disruption to Communities	Displacements	▪ Greater opportunity for reuse and redevelopment	▪ Less opportunity for reuse and redevelopment
	Agricultural parcels	14–31 (23–42 acres)	
	Residential Parcels	9–60 (2–21 acres)	
	Commercial Parcels	5–36 (3–7 acres)	
	Industrial Parcels	68–115 (37–60 acres)	
	Properties with access affected	▪ Property access to local road network generally retained because alignment is on elevated viaduct.	▪ Greater severance issues with at-grade sections and near street grade separations.
	Local traffic effects around stations	▪ Station on viaduct has no direct impact on traffic.	▪ Greater traffic impact near station and other locations due to interruptions in the street grid and disruption

Table 4-2. Fresno Subsection – Comparison of Elevated vs. Mixed At-Grade/Elevated Alternatives

Category	Measure	Elevated (B1, B2, B3, B4, B5, B6)	Mixed At-Grade/Elevated (B7, B8, B9, B10, B11, B12)
			added by grade separations.
	Local traffic effects at grade separations	▪ Elevated profile requires no new street grade separations.	▪ New street grade separations would impact traffic flow. Other street improvements could mitigate this impact.
Design Objectives	Travel time (220 mph)	▪ min: 5 min 24 sec ▪ max: 6 min 8 sec	▪ min: 4 min 45 sec ▪ max: 6 min 8 sec
	Route length	▪ Similar. Approximately 13.5 miles.	
	Intermodal connections	▪ Equally feasible.	
	Capital costs	▪ Lower overall costs, despite higher costs for elevated structures.	▪ Total cost for mixed profile higher due to freeway reconstruction, extensive roadway grade separations, utility relocations, right-of-way acquisition, and extended construction time.
	Operating costs	▪ Slightly lower power usage and vehicle wear due to fewer climb-and-descend movements.	▪ Slightly higher power usage and vehicle wear due to repeated climb-and-descend movements.
	Maintenance costs	▪ Slightly higher due to viaduct sections.	▪ Slightly lower for at-grade sections.
Land Use	Potential for Transit Oriented Development	▪ TOD potential is identical.	
	Consistency with other planning efforts	▪ More compatible with downtown Fresno planning efforts as it leaves east-west traffic and pedestrian movement barrier-free.	▪ Less compatible with local planning efforts because of disruption to local roadways and street grid.
Constructability	Constructability	▪ Continuous viaduct offer a more straightforward construction challenge, as work is largely above the ground once foundations and piers have been placed.	▪ Much more difficult. Mixed profile includes major structures over railroads and reconstruction of SR-41 and SR-180 freeways. At-grade construction much more complex and time-consuming due to street closures, grade separations, utility relocations, and generally greater construction footprint.
	Disruption to existing railroads	▪ Construction within or near existing railroads is similar for both profiles. More complexity with mixed profile due to greater extent of ground-level activity.	
	Disruption to and	▪ Limited utility conflicts: only	▪ Crosses 106–141 utilities:

Table 4-2. Fresno Subsection – Comparison of Elevated vs. Mixed At-Grade/Elevated Alternatives

Category	Measure	Elevated (B1, B2, B3, B4, B5, B6)	Mixed At-Grade/Elevated (B7, B8, B9, B10, B11, B12)
	relocation of utilities	at viaduct piers.	▪ 1–2 natural gas lines ▪ 2 electric transmission lines ▪ 1–3 storm drain ▪ 67–88 water lines ▪ 30–40 sewer lines, and ▪ 4–6 planned pipelines in the Fresno Metro Flood Control District.
Environmental Resources	Waterways/Sensitive Habitat Areas	▪ No crossings of waterways, wetlands, natural areas/critical habitats, or nature preserves. ▪ No crossings of designated critical habitat. ▪ Crosses 76 acres and 3 threatened or endangered species: California tiger salamander, California jewel-flower, Fresno kangaroo rat.	
	Cultural Resources	▪ Same for both profiles. ▪ No impacts to National Register of Historic Places-listed structures. ▪ Crosses 1–4 sites listed in CHRIS database.	
	Parklands	▪ Same for both profiles: ▪ Directly impacts Roeding Park (9 acres). ▪ 10 parks (26–35 acres) located within quarter-mile.	
	Agricultural lands	▪ Same for both profiles: ▪ Traverses 23–42 acres of important farmland south of Fresno; 21–38 acres classified as prime.	
	Noise and vibration	▪ Less noise impact close. Viaduct mileage in urban Fresno is approximately twice that of the mixed profile (approx. 6–8 miles vs. approx. 2–4 miles).	▪ Greater noise impact closer, less farther away.
		▪ 481–747 sensitive noise receptors along the alignment ▪ 66–240 sensitive vibration receptors (all residential parcels) within 275 feet of the alignment	
	Visual/scenic resources	▪ Greater visual impact. Viaduct mileage in urban Fresno is approximately twice that of the mixed profile.	▪ Lesser visual impact.
	Geotechnical constraints	No known seismic faults, highly erodible soils, or identified landslide locations.	
	Hazardous materials	▪ 6–16 hazardous materials sites	

Note: Dark gray shading in the table Header indicates which alternatives were not recommended to be carried forward to the environmental review. Gray shading in the table body indicates the reason for that recommendation.

Based on these findings, it is recommended the mixed at-grade/elevated alternatives (Alternatives B7 to B12) not be carried forward.

The second step in the selection process focused on differences among horizontal alignments for the remaining alternatives (i.e., B1 to B6). Table 4-3 summarizes this comparison.

It is recommended that the three alternatives connecting to the Rural Subsection via the UPRR (B4, B5, and B6) not be carried forward due to considerations described in Section 4.2 of this report (below). The three elevated alternatives that connect to the Rural Subsection via the BNSF alignment (B1, B2, and B3) remain as potentially viable alternatives.

As Table 4-3 highlights, Alternative B3 (Golden State Boulevard) would have greater impacts on Chinatown, which is a locally important cultural area, than either Alternative B1 or B2, and would require a station location least consistent with respect to the City of Fresno's redevelopment vision for the downtown.. Conversely, Alternative B3 have the same adverse effects on Roeding Park and downtown circulation and displacement., It is recommended that Alternative B3 not be carried forward.

Alternatives B1 and B2 should be retained for further analysis during the environmental review and preliminary design processes. Table 4-4 summarizes the findings of the evaluation of all of the alternatives considered for the Fresno Subsection (i.e., Alts B1 through B12). The retained alternatives are shown on Figure 4-12**.**

In addition, a hybrid of Alternatives B1 and B2 that would avoid Roeding Park and the Historic SP Depot (B13) should also be studied in the EIR/EIS.

Table 4-3. Fresno Subsection – Comparison of Elevated Alternatives (B1–B6)

Category	Measurement	To Bakersfield via BNSF			To Bakersfield via UPRR[1]		
		UPRR West (B1)	UPRR East (B2)	Golden State Blvd (B3)	UPRR West (B4)	UPRR East (B5)	Golden State Blvd (B6)
Disruption to Communities	Displacements	Alignment crosses: • 30 agricultural parcels (41 acres) • 11 residential parcels (2 acres) • 13 commercial parcels (4 acres) • 79 industrial parcels (45 acres)	Alignment crosses: • 30 agricultural parcels (42 acres) • 60 residential parcels (13 acres) • 5 commercial parcels (3 acres) • 71 industrial parcels (35 acres)	Alignment crosses: • 31 agricultural parcels (41 acres) • 9 residential parcels (2 acres) • 36 commercial parcels (7 acres) • 68 industrial parcels (37 acres)	Alignment crosses: • 14 agricultural parcels (23 acres) • 11 residential parcels (2 acres) • 13 commercial parcels (4 acres) • 115 industrial parcels (63 acres)	Alignment crosses: • 20 agricultural parcels (26 acres) • 57 residential parcels (21 acres) • 5 commercial parcels (3 acres) • 90 industrial parcels (53 acres)	Alignment crosses: • 14 agricultural parcels (23 acres) • 10 residential parcels (2 acres) • 36 commercial parcels (7 acres) • 106 industrial parcels (59 acres)
	Properties with access affected	Property access to local road network generally retained because alignment is on elevated viaduct.	Similar to B1. Reconstruction of North Weber Avenue would impact properties and local streets.	Similar to B1.	Similar to B1. Severs access to Golden State Boulevard from the west between American Avenue and East North Avenue. Generally, alternative access could be provided.	Similar to B1. Same as B2.	Similar to B1. Same as B4.
	Local traffic effects around stations	Similar. All station sites are located on viaducts within a very few blocks of each in the downtown. Placement of parking structures, intermodal transit centers, and pick up/drop off areas varies only slightly, producing similar effects on traffic. Specific mitigation will be designed for the selected alignment and station location.					
	Local traffic effects at grade separations	All alternatives are elevated. No street grade separations are required.					
Design Objectives	Travel time (220 mph)	Similar. 4 minutes 45 seconds to 6 minutes 8 seconds.					
	Route length	Similar. 13.5 miles.					
	Intermodal connections	Similar to B2, but farther from downtown core and mass transit service.	Slightly better than B1 and B3 due to location east of UPRR.	Location is least accessible to transit.	Same as B1.	Same as B2.	Same as B3.
	Capital and Maintenance Costs	Mid-range of alternatives compared (6 miles of viaduct).	Slightly higher than B2 due to longer viaduct (7 miles).	Similar to B1.	Lowest due to shortest viaduct length (5 miles).	Highest due to SR-99 and Golden State Blvd crossings, plus longest viaduct (8.5 miles).	Mid-range of alternatives compared (6.5 miles of viaduct).
	Operating costs	Similar. Length and profile (elevated) are virtually identical among alternatives. Curve radii vary very slightly, but not enough to materially affect operations.					
Land Use	Potential for Transit Oriented Development	The Downtown Fresno redevelopment project area encompasses all potential station locations. The Fresno Redevelopment Agency anticipates continued investment in revitalization of the area. The City's Downtown and Community Revitalization Department has initiated the Fulton Corridor Specific Plan and Downtown Neighborhoods Specific Plan, which would focus on maximizing development potential in its study area, which includes all three potential locations.					
		Good potential for TOD, slightly less than B2 due to location of UPRR tracks between the station and the downtown core.	Greatest potential for supporting TOD based on proximity to City's developed core and planned redevelopment.	Only moderate potential for TOD due to distance from the downtown core and potential incompatibility of TOD with historic Chinatown district.	Same as B1.	Same as B2.	Same as B3.
	Consistency with other planning efforts	All station locations are consistent with other planning efforts. City of Fresno 2025 General Plan includes no policy direction that favors one or more alternatives.					
		Generally consistent, but slightly less so than B2 due to location of UPRR tracks between the station and the downtown core.	Most consistent with recent and current planning. Fresno DTI Study assumes UPRR East alignment.	Least consistent given desire for thematic redevelopment of Chinatown.	Same as B1.	Same as B2.	Same as B3.
Constructability	Constructability	Viaduct construction through downtown would need to be phased to reduce traffic disruption. Viaduct needs to accommodate approximately 6,000 feet of elevated station and station platform tracks across numerous city blocks. Construction access is from local road network. Local traffic needs require extensive and complex staging. Pier construction constrained by access restrictions and restrictions of working near traffic.					
		Construction over SR-99 and Golden State Blvd requires extensive phasing	Same as B1.	Skewed crossing of Golden State Blvd could make portal structure necessary,	Similar to B1.	Reconstruction of North Weber Avenue required.	Similar to B4.

Table 4-3. Fresno Subsection – Comparison of Elevated Alternatives (B1–B6)

Category	Measurement	To Bakersfield via BNSF			To Bakersfield via UPRR[1]		
		UPRR West (B1)	UPRR East (B2)	Golden State Blvd (B3)	UPRR West (B4)	UPRR East (B5)	Golden State Blvd (B6)
		and traffic control plans.	Skewed UPRR crossings north of Roeding Park and near Calwa Yard constrained by working restrictions near live tracks and by access limitations.	increasing complexity and disruption.	Viaduct over BNSF and Golden State Boulevard constrained by adjacent Golden State Blvd viaduct. Temporary closures of Golden State Boulevard required.	Skewed crossing over UPRR (north of Roeding Park) requires complex staging. Second skewed crossing of Golden State Boulevard and UPRR railroad at American Avenue requires staged construction and access/temporary closure restrictions.	Realignment of Golden State Boulevard needed to the west adjacent to and north of Roeding Park.
	Disruption to existing railroads	Temporary closures required during construction; construction activities constrained. Construction of railroad crossings could require temporary closures and construction of temporary track. Construction activities constrained by working restrictions near live tracks, access limitations, and closure limitations.					
		Construction of 2 bridges over existing SJVR constrained by working restrictions near live tracks, access limitations, and temporary closure limitations. No sidings severed.	Two skewed crossings near Calwa Yard and Roeding Park require complex staging. Relocation of BNSF tracks adjacent to Church Avenue possibly necessary; Calwa Yard access from the north changed. Temporary closures of SJVR and industrial siding near California Avenue.	Two bridges over existing SJVR require complex staging. No sidings severed.	Three bridges over BNSF mainline near Calwa crossing and over SJVR lines require complex staging. No sidings severed.	Complex construction through Calwa Yard due to reduced availability of space for piers. Some yard tracks require relocation. Relocation of BNSF mainlines between Calwa Yard and Church Ave necessary. One industrial siding severed south of North Avenue. Temporary closures of SJVR and industrial siding at California Avenue required.	Construction of two bridges over existing SJVR requires complex staging. No sidings severed. Construction possibly requires temporary rerouting of BNSF and SJVR.
	Disruption to and relocation of utilities	Alignment crosses 106 utilities: ▪ 1 natural gas line ▪ 2 electric transmission lines ▪ 1 storm drain ▪ 67 water lines ▪ 30 sewer lines, and ▪ 5 planned pipelines in the Fresno Metro Flood Control District	Alignment crosses 116 utilities: ▪ 1 natural gas line ▪ 2 electric transmission lines ▪ 2 storm drains ▪ 70 water lines ▪ 37 sewer lines, and 4 planned pipelines in the Fresno Metro Flood Control District	Alignment crosses 141 utilities: ▪ 2 natural gas line ▪ 2 electric transmission lines ▪ 3 storm drains ▪ 88 water lines ▪ 40 sewer lines, and 6 planned pipelines in the Fresno Metro Flood Control District	Alignment crosses 109 utilities. ▪ 1 natural gas line ▪ 6 electric transmission lines ▪ 1 storm drain ▪ 59 water lines ▪ 40 sewer lines, and ▪ 6 planned pipelines within the Fresno Metro Flood Control District	Alignment crosses 108 utilities: ▪ 1 natural gas line ▪ 6 electric transmission lines ▪ 61 water lines ▪ 38 sewer lines ▪ 1 planned water line and ▪ 2 planned sewer lines within the Malaga County Water District ▪ 3 planned pipelines in the Fresno Metro Flood Control District	Alignment crosses 141 utilities: ▪ 2 natural gas lines ▪ 6 electric transmission lines ▪ 1 storm drain ▪ 86 water lines ▪ 46 sewer lines, and ▪ 6 planned pipelines in the Fresno Metro Flood Control District
Environmental Resources	Waterways/Sensitive Habitat Areas	No crossings of waterways, wetlands, natural areas/critical habitats, or nature preserves. No crossing of designated critical habitat. Crosses 76 acres of habitat for 3 threatened or endangered species: ▪ California Tiger Salamander ▪ California Jewel-Flower ▪ Fresno Kangaroo Rat					
	Cultural Resources	No impact on National Register of Historic Places listed structures. Crosses 4 sites listed in the CHRIS database.	Displaces Southern Pacific Railroad Depot building, an NRHP listed resource. Same as B1.	No impact on National Register of Historic Places listed structures. Crosses 3 sites listed in the CHRIS database.	Same as B1. Crosses 1 site listed in the CHRIS database.	Same as B2. Same as B4.	Same as B1. Same as B4.
	Parklands	Directly impacts Roeding Park (9 acres). 10 parks (26 acres) located within quarter-mile of the alignment.	Directly impacts a small park (0.4 acre) southeast of Roeding Park on east side of UPRR. 8 parks (23 acres) within quarter-mile of the alignment.	Same a B1. 11 parks (31 acres) within quarter-mile of the alignment.	Same as B1. 10 parks (35 acres) within quarter-mile of the alignment.	Same as B2. 9 parks (51 acres) within quarter-mile of the alignment.	Same as B1. 11 parks (37 acres) within quarter-mile of the alignment.
	Agricultural lands	Traverses 42 acres of important farmland; 38 acres classified as prime.	Same as B1.	Traverses 41 acres of important farmland; 37 acres classified as prime.	Traverses 23 acres of important farmland; 21 acres classified as prime.	Traverses 27 acres of important farmland; 22 acres classified as prime.	Same as B4.

Table 4-3. Fresno Subsection – Comparison of Elevated Alternatives (B1–B6)

Category	Measurement	To Bakersfield via BNSF			To Bakersfield via UPRR[1]		
		UPRR West (B1)	UPRR East (B2)	Golden State Blvd (B3)	UPRR West (B4)	UPRR East (B5)	Golden State Blvd (B6)
	Noise and vibration	481 sensitive noise receptors: ▪ 480 residential parcels ▪ 1 historic property 66 sensitive vibration receptors within 275 feet of the alignment: ▪ 66 residential parcels	624 sensitive noise receptors: ▪ 621 residential parcels ▪ 2 churches ▪ 1 historic property 216 sensitive vibration receptors within 275 feet of the alignment: ▪ 216 residential parcels	521 sensitive noise receptors: ▪ 519 residential parcels ▪ 1 church ▪ 1 historic property 65 sensitive vibration receptors within 275 feet of the alignment: ▪ 65 residential parcels	543 sensitive noise receptors: ▪ 539 residential parcels 1 church ▪ 2 schools ▪ 1 historic property 71 sensitive vibration receptors within 275 feet of the alignment: ▪ 71 residential parcels	747 sensitive noise receptors: ▪ 741 residential parcels ▪ 3 churches ▪ 2 schools 1 historic property 240 sensitive vibration receptors within 275 feet of the alignment: ▪ 239 residential parcels ▪ 1 church	584 sensitive noise receptors: ▪ 579 residential parcels ▪ 2 churches ▪ 2 schools ▪ 1 historic property 69 sensitive vibration receptors within 275 feet of the alignment: ▪ 69 residential parcels
	Visual/scenic resources	Elevated structure 60 feet above ground level from Clinton Avenue to south urbanized limit. Elevated structure visible from the Roeding Park and nearby residential communities.					
		594 residential parcels within quarter-mile of elevated structure.	1,490 residential parcels within quarter-mile of the elevated structure.	1,327 residential parcels within quarter-mile of the elevated structure. Elevated structure bisects Chinatown district.	631 residential parcels within quarter-mile of the elevated structure.	1,589 residential parcels within quarter-mile of the elevated structure.	660 residential parcels within quarter-mile of the elevated structure. Elevated structure bisects Chinatown district.
	Geotechnical constraints	No known seismic faults. Highly erodible soils or identified landslide locations.					
	Hazardous materials	6 hazardous materials sites (least).	9 hazardous materials sites.	9 hazardous materials sites.	16 hazardous materials sites (most).	11 hazardous materials sites.	13 hazardous materials sites.

Note: Dark gray shading in the table Header indicates which alternatives were not recommended to be carried forward to the environmental review. Gray shading in the table body indicates the reason for that recommendation.

1. Alternatives that followed the UPRR route to the Rural Subsection were withdrawn from consideration because of recommendations made in the Rural Subsection.

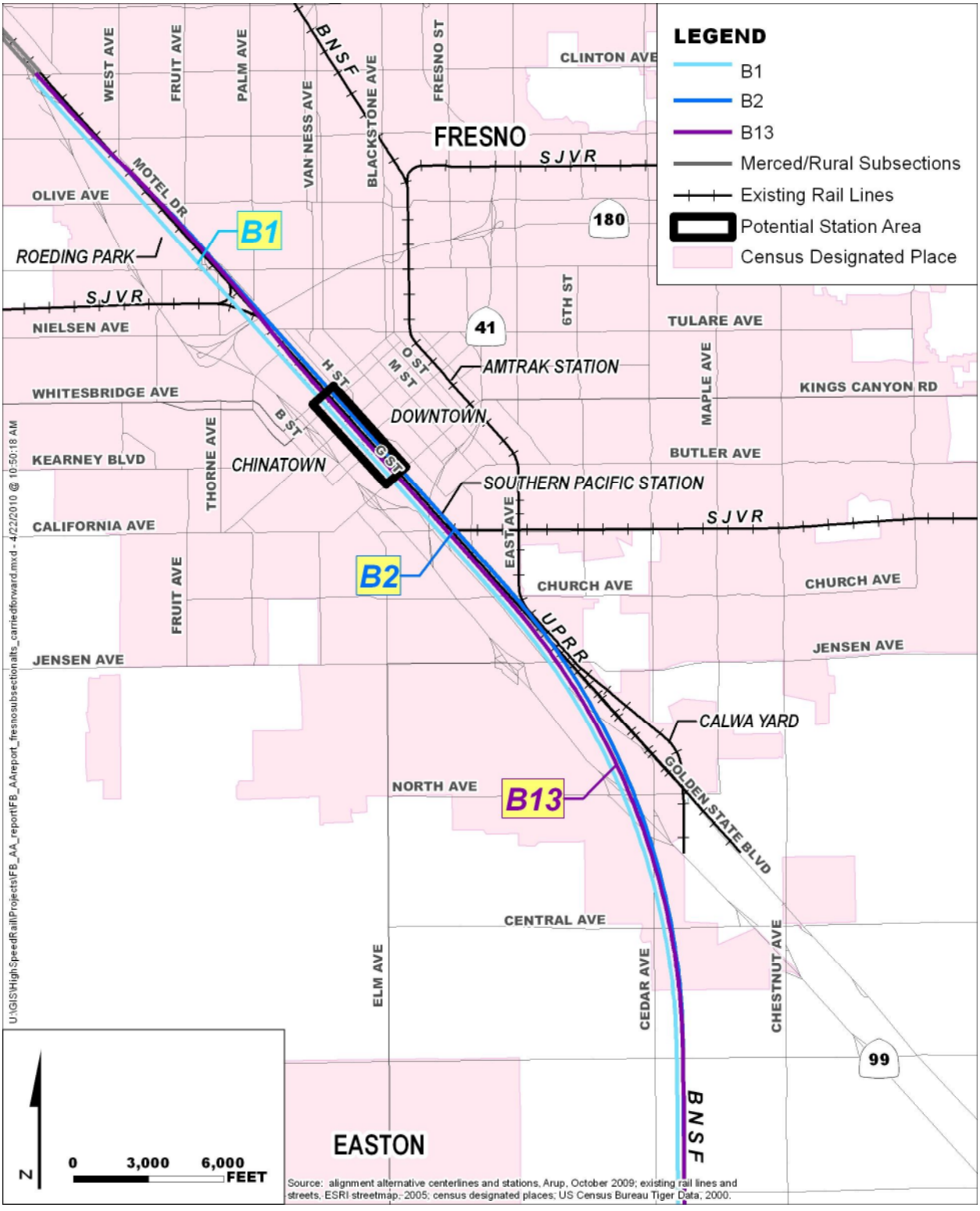
Table 4-4. Summary of Alternatives Recommended to Carry Forward or Withdrawn

Alt.	Alignment	Evaluation Findings	Recommendation
B1	UPRR West Elevated BNSF to Bakersfield	▪ Locates station close to downtown as preferred by City of Fresno. ▪ Elevated guideway less disruptive to adjacent uses than at-grade. ▪ Elevated alignment eliminates multiple changes of vertical profile, minimizes passenger discomfort due to "roller coaster" effect, and reduces at-grade impacts to roadways. ▪ Elevated guideway minimizes disruption of existing street grid. ▪ Least direct impact to Roeding Park. ▪ Shortest aerial structure through downtown. ▪ Fewest noise and vibration-sensitive receptors. ▪ Fewest hazardous material sites among the alternatives. ▪ Fewest residences near elevated structure.	Carry Forward
B2	UPRR East Elevated BNSF to Bakersfield	▪ Does not affect Roeding Park. ▪ Station location downtown, as preferred by City of Fresno. ▪ Elevated guideway less disruptive to adjacent uses than at-grade. ▪ Elevated alignment eliminates multiple changes of vertical profile, minimizes passenger discomfort due to "roller coaster" effect, and reduces at-grade impacts to roadways. ▪ Elevated guideway minimizes disruption of existing street grid. ▪ Directly affects historic Southern Pacific depot.	Carry Forward
B3	Golden State Blvd Elevated BNSF to Bakersfield	▪ Located farthest from the station location preferred by City of Fresno. ▪ Complex geometry to curve alongside UPRR and Roeding Park. ▪ The four-track cross-section for the station is approximately twice as long as those for Alternatives B1 and B2 (approx 2 miles compared to approx 1.1 miles). ▪ Greatest impact to Roeding Park. ▪ Among the highest number of sensitive noise receptors and residential parcels. ▪ Elevated structure would affect Chinatown. ▪ Among the highest number of hazardous material sites.	Not Carry Forward
B4	UPRR West Elevated UPRR to Bakersfield	▪ Infeasible given elimination of UPRR route in Rural Subsection (Section 4.2)	Not Carry Forward
B5	UPRR East Elevated UPRR to Bakersfield	▪ Infeasible given elimination of UPRR route in Rural Subsection (Section 4.2)	Not Carry Forward
B6	Golden State Blvd Elevated UPRR to Bakersfield	▪ Infeasible given elimination of UPRR route in Rural Subsection (Section 4.2)	Not Carry Forward
B7	UPRR West At-Grade/Elevated BNSF to Bakersfield	▪ Locates station close to downtown as preferred by City of Fresno. ▪ At-grade alignment would disrupt existing infrastructure. ▪ At-grade guideway disruptive to existing street grid (ten arterials grade-separated or severed, including several downtown). ▪ Severs SJVR connections. ▪ Direct impacts to Roeding Park.	Not Carry Forward

Table 4-4. Summary of Alternatives Recommended to Carry Forward or Withdrawn

Alt.	Alignment	Evaluation Findings	Recommendation
B8	UPRR East At-Grade/Elevated BNSF to Bakersfield	▪ Directly affects historic Southern Pacific depot. ▪ At-grade alignment would disrupt existing infrastructure. ▪ At-grade guideway disruptive to existing street grid (nine arterials grade-separated or severed, including several downtown). ▪ Among the highest number of hazardous material sites. ▪ Most sensitive noise and vibration receptors.	Not Carry Forward
B9	Golden State Blvd At-Grade/Elevated BNSF to Bakersfield	▪ Located farthest from the station location preferred by City of Fresno. ▪ Complex geometry to curve alongside UPRR and Roeding Park. ▪ At-grade alignment would disrupt existing infrastructure. ▪ At-grade guideway disruptive to existing street grid (nine arterials grade-separated or severed, including several downtown). ▪ Severs SJVR or requires costly realignment to a new route, possibly out of downtown. ▪ Greatest impact on Roeding Park. ▪ Among the highest number of adjacent sensitive noise receptors and residential parcels. ▪ Among the highest number of hazardous material sites ▪ Greatest impact on Chinatown.	Not Carry Forward
B10	UPRR West At-Grade/Elevated UPRR to Bakersfield	Infeasible given elimination of UPRR route in Rural Subsection (Section 4.2)	Not Carry Forward
B11	UPRR East At-Grade/Elevated UPRR to Bakersfield	Infeasible given elimination of UPRR route in Rural Subsection (Section 4.2)	Not Carry Forward
B12	Golden State Blvd At-Grade/Elevated UPRR to Bakersfield	Infeasible given elimination of UPRR route in Rural Subsection (Section 4.2)	Not Carry Forward
B13	UPRR West/UPRR East Crossover Alternative	▪ Impacts and benefits similar to B1 and B2. ▪ Avoids impact on Roeding Park and historic SP Depot. ▪ Higher construction cost and complexity, and greater visual impact from two highly skewed UPRR crossings.	Carry Forward

Figure 4-12. Alternatives Carried Forward – Fresno Subsection



4.2. Rural Subsection

The Rural Subsection begins at E. Manning Avenue in Fresno and continues south to Hageman Road in Rosedale, northwest of Bakersfield. Alignments in this subsection cross largely agricultural land in Fresno, Kings, Tulare, and Kern counties, and either go through or skirts around the cities of Fowler, Selma, Kingsburg, Hanford, Visalia, Corcoran, Wasco, and Shafter.

4.2.1. Alternatives Considered

Six alternatives through the entire length of the Rural Subsection were carried forward from the Initial Screening (C1 through C6), all configured to serve a potential station in the vicinity of Visalia, Tulare, and Hanford (see Table 4-5 and Figure 3-7). Three of these alternatives (C1, C2, and C3) were based on the Program EIR/EIS Preferred Alignment, generally paralleling the BNSF right-of-way from Fresno to Bakersfield and serving a potential station just east of Hanford. The other three alternatives (C4, C5, and C6) were configured to serve a potential station closer to Visalia and would generally parallel the UPRR between Fresno and Visalia before rejoining the BNSF right-of-way south of Corcoran. In Table 4-5, the alternatives are also defined in terms of their orientation to the adjacent rail alignment and which potential station site is served.

Table 4-5. Rural Subsection Alternatives Evaluated

Alt	Horizontal Alignment	Relationship to Rail Right-of-Way	Station Location(s)
C1	BNSF-Hanford East Bypass	Shared	198 West
C2	BNSF-Hanford East Bypass	Separate Side Alignment	198 West
C3	BNSF-Hanford East Bypass	East Side Alignment	198 West
C4	UPRR to BNSF	Shared	99 North, 99 Center, 198 East
C5	UPRR to BNSF	Separate Side Alignment	99 North, 99 Center, 198 East
C6	UPRR to BNSF	East Side Alignment	99 North, 99 Center, 198 East

A series of local options was developed after analysis of the Initial Alternatives, representing different approaches to bypassing the communities of Fowler, Selma, Kingsburg, Corcoran, Wasco, and Shafter. The options and alternatives to which they apply are shown in Table 4-6.

Table 4-6. Rural Subsection Local Options Evaluated

Option	Horizontal Alignment	Vertical Profile	Relationship to BNSF Right-of-Way	Applicable Alternatives
CBPA	Fowler, Selma, Kingsburg Greenfield Bypass	At-Grade	N/A	C4, C5, C6
CBPB	Fowler, Selma, Kingsburg Near-Town Bypass	At-Grade	N/A	C4, C5, C6
CVSA	Visalia 198 East Station	At-Grade	N/A	C4, C5, C6
CVSB	99 Center Station (South of 198)	At-Grade	N/A	C4, C5, C6
CVSC	99 North Station (Goshen)	Elevated	N/A	C4, C5, C6
CPAA*	BNSF Hanford West Bypass	At-Grade	N/A	C1, C2, C3
CTT1A	Corcoran Through Town	At-Grade	West	C1, C2, C3
CTT1B	Corcoran Through Town	Elevated	East	C1, C2, C3
CTT1C	Corcoran Bypass East Side	At-Grade	N/A	C1, C2, C3
CAAA	Allensworth Bypass Alternative	At-Grade	NA	All

Table 4-6. Rural Subsection Local Options Evaluated

Option	Horizontal Alignment	Vertical Profile	Relationship to BNSF Right-of-Way	Applicable Alternatives
CTT2A	Wasco/Shafter Through Town	At-Grade	East	All
CTT2B	Wasco/Shafter Through Town	Elevated	East	All
CTT2C	Wasco East Side bypass, through Shafter	At-Grade	N/A	All
CTT2D	Wasco/Shafter East Side Bypass	At-Grade	N/A	All
CTT2E	Wasco/Shafter Through Town	Elevated in Wasco At-Grade in Shafter	East	All
CTT2F	Wasco/Shafter Through Town	At-Grade in Wasco Elevated in Shafter	East	All
CTT2G	Wasco/Sharter/7th Standard Road East Bypass	At-Grade	East	All
*PEIR/EIS Preferred Alignment.				

4.2.2. Evaluation

Each alternative and option was assessed against the project objectives and evaluation criteria outlined in Section 2.0. This information established a basis to determine which alternatives to carry forward into preliminary engineering design and environmental review as part of the EIR/EIS.

Within this Subsection, the alternatives and local options reflect trade-offs that are principally between community impacts on the one hand and agricultural and natural resources impacts on the other. In general, alternatives that pass through the communities of the Rural Subsection (i.e., Fowler, Selma, Kingsburg, Hanford, Corcoran, Wasco, Shafter) would be disruptive to the local roadway networks and fabric of those communities in ways that could be economically damaging. Conversely, alternatives that bypass those communities would affect natural resources, agricultural land and operations, or both. The effects on agricultural land would be particularly pronounced in areas where alignments traverse the property "grid" at skewed angles. In such cases, parcels could be fragmented in ways that would render them uneconomic. Similar tradeoffs are evident in areas where the HST alignments diverge from existing transportation corridors in order to maintain HST geometric design standards (e.g., radii for curves).

In addition to the community vs. resource trade-offs, all of the alternatives and local options are further evaluated based on their relationships to key local features or constraints:

- **BNSF Railway** – All alternatives follow the BNSF right-of-way for some portion of the alignment. BNSF's operations include a number of spurs, sidings, and yards. Various options have been considered with varying degrees of impact to these operations, ranging from severance of operations to avoidance.

- **Pixley National Wildlife Refuge** – The refuge encompasses over 6,000 acres of grassland, vernal pool, and playa habitat managed by the U.S. Fish and Wildlife Service (USFWS). The refuge also contains over 300 acres of wetlands. Alternatives C3 and C6 would encroach on the western side of the Pixley National Wildlife Refuge. Alternatives C4 and C5 would encroach on the refuge where they cross the BSNF tracks..

- **Allensworth State Historic Park** – Colonel Allensworth State Historic Park is managed by the California Department of Parks and Recreation. The park includes the Allensworth Townsite, established in 1908, which includes historic structures, a visitor center, camp sites, picnic areas, and restrooms. Alternatives C1, C2, C4, and C5 would require a strip of land on the western side

of BNSF, on the eastern side of the park. A change of access to the park from SR-43 may also be required.

- **Allensworth Ecological Reserve** – The Allensworth Ecological Reserve is managed by the California Department of Fish and Game, and comprises over 5,000 acres of contiguous parcels in Kern and Tulare counties. All alternatives (C1 through C6) would encroach on some part of the reserve.

- **Designated Critical Habitat** – The analyzed alternatives and options traverse areas that the USFWS has designated as critical habitat for three species: the vernal pool fairy shrimp, the tadpole shrimp, and the California tiger salamander. Alternatives C3 through C6, as well as local options CBPA, CBPB, CVSA, CVSB, and CVSC, cross designated critical habitat.

To facilitate comparison of the alternatives under consideration, the Rural Subsection has been divided into four geographic areas: UPRR to BNSF; BNSF, Fresno to Corcoran; BNSF, Corcoran to Wasco; and BNSF, Wasco to Rosedale. The results of the evaluation of Rural Subsection alternatives are detailed in five tables that are presented at the end of this section: Table 4-7 (page 4-38), Table 4-8 (page 4-41), Table 4-9 (page 4-43), Table 4-10 (page 4-46), and Table 4-11 (page 4-46). The impacts common to all alternatives, station, local options, and additional local option are documented in Appendix F-2 – Impacts Common to all Alternatives – Rural Subsection.

A. UPRR to BNSF

This portion of the route stretches from south of Calwa Yard west of SR-99, in Fresno, to where the alignments meet the BNSF right-of-way north of the Allensworth State Historic Park. The southernmost part of this area crosses through approximately 30 miles of agricultural land, passing beside Pixley National Wildlife Refuge before rejoining the BNSF right-of-way. The alternatives under consideration (C4, C5, and C6) were developed during the *Visalia-Tulare-Hanford Station Feasibility Study* to identify possible stations near Visalia.

Fowler, Selma, and Kingsburg Bypass Options

As a result of opposition to through-town alignments by Fowler, Selma, and Kingsburg, only bypass alternatives were analyzed in south Fresno County. One bypass alignment (CPBA) was originally defined in the *Visalia-Tulare-Hanford Station Feasibility Study*. Subsequently, a bypass closer to the three towns (CBPB) was defined to minimize impacts to agricultural land.

Visalia Station Options

During the evaluation of Initial Alternatives, three possible stations in the Visalia area and alignments to serve them were proposed for further study: 198 East, 99 Central, and 99 North. The options differ slightly with respect to length, profile, and cost but are otherwise similar in their impacts on agriculture and natural resources.

B. BNSF Route – Fresno to Corcoran

As these alignment alternatives leave the Fresno area (Figure 4-13, Figure 4-14, Figure 4-15, and Figure 4-16), major impacts are disruptions to BNSF facilities and customers, including several areas where sidings would be severed. A proposed heavy maintenance facility site is located in this area.

Figure 4-13. Typical Cross Section for Shared Right-of-Way – Looking North

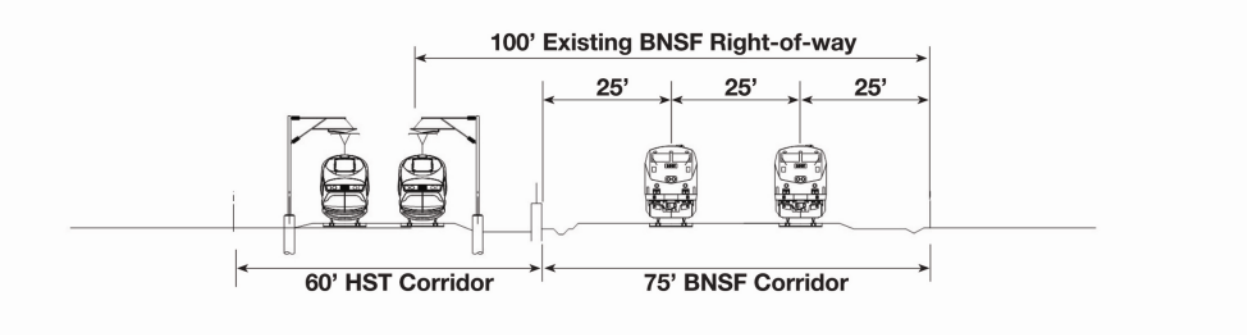
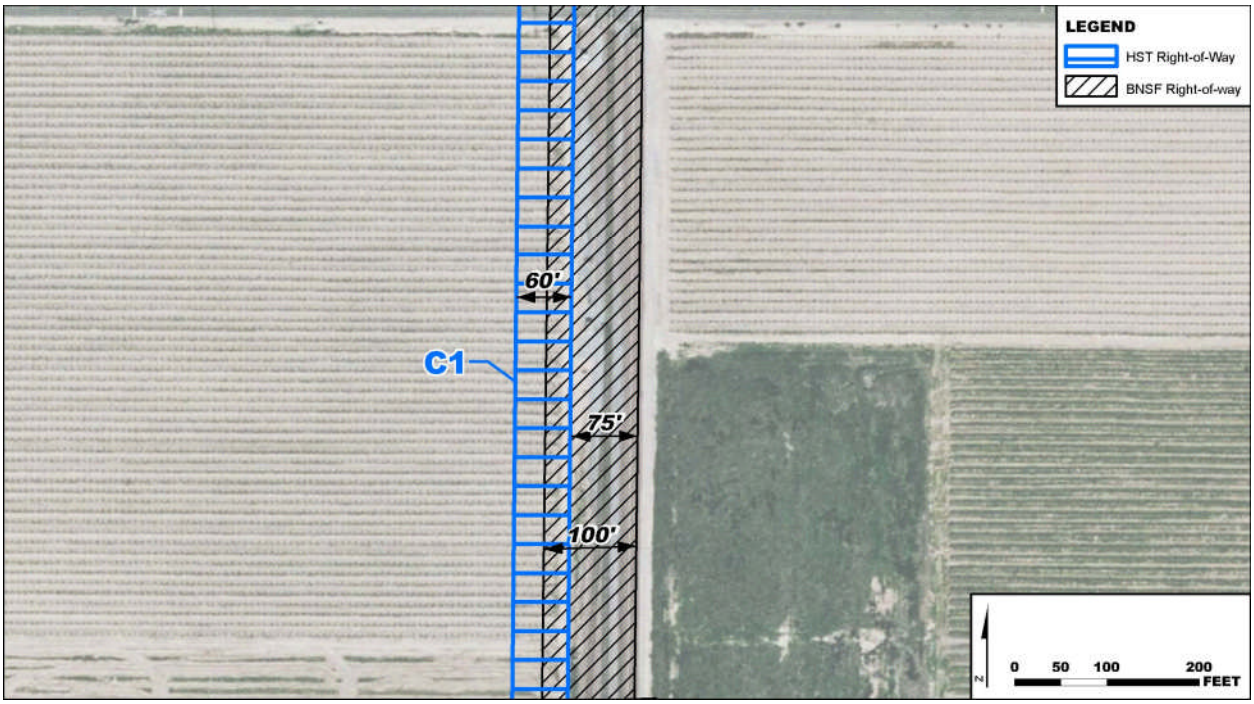


Figure 4-14. Alternative C1 leaving Fresno, Showing Shared Alignment



South of Bowles,all alignments leave the BNSF corridor to pass the city of Hanford to the east, and cross through parcels at skew angles, fragmenting otherwise contiguous agricultural properties. Such fragmentation could compromise the economic viability of agricultural operations. Where the alignments are oriented more closely with the north-south grid, they continue to divide agricultural parcels, albeit into potentially more viable configurations.

Further south, a potential station has been identified in the area of the SR-198/SR-43 interchange.

A bypass option on the west side of Hanford (CPAA), consistent with the Program EIR/EIS Preferred Alignment, would would not be suitable for a station service the Visalia/Tulare/Hanford area, and yet would have adverse effects on agricultural land and operations similar to those of the alignment passing east of Hanford.

Figure 4-15. Typical Cross Section for Separate Right-of-Way – Looking North

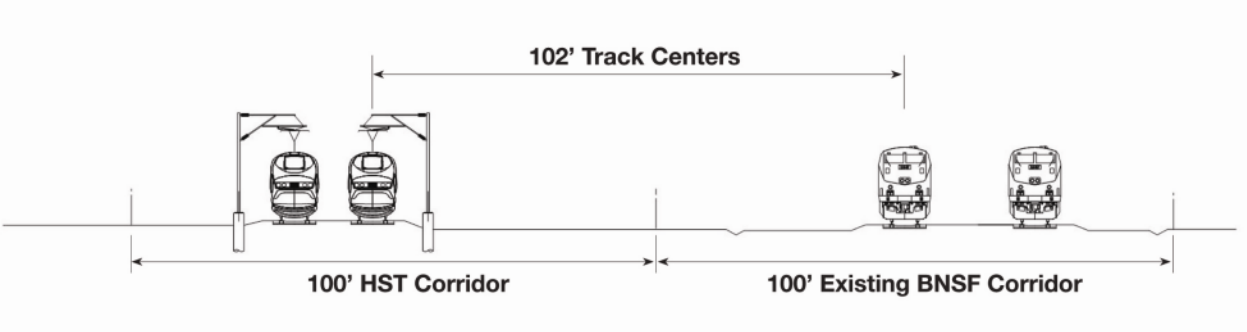
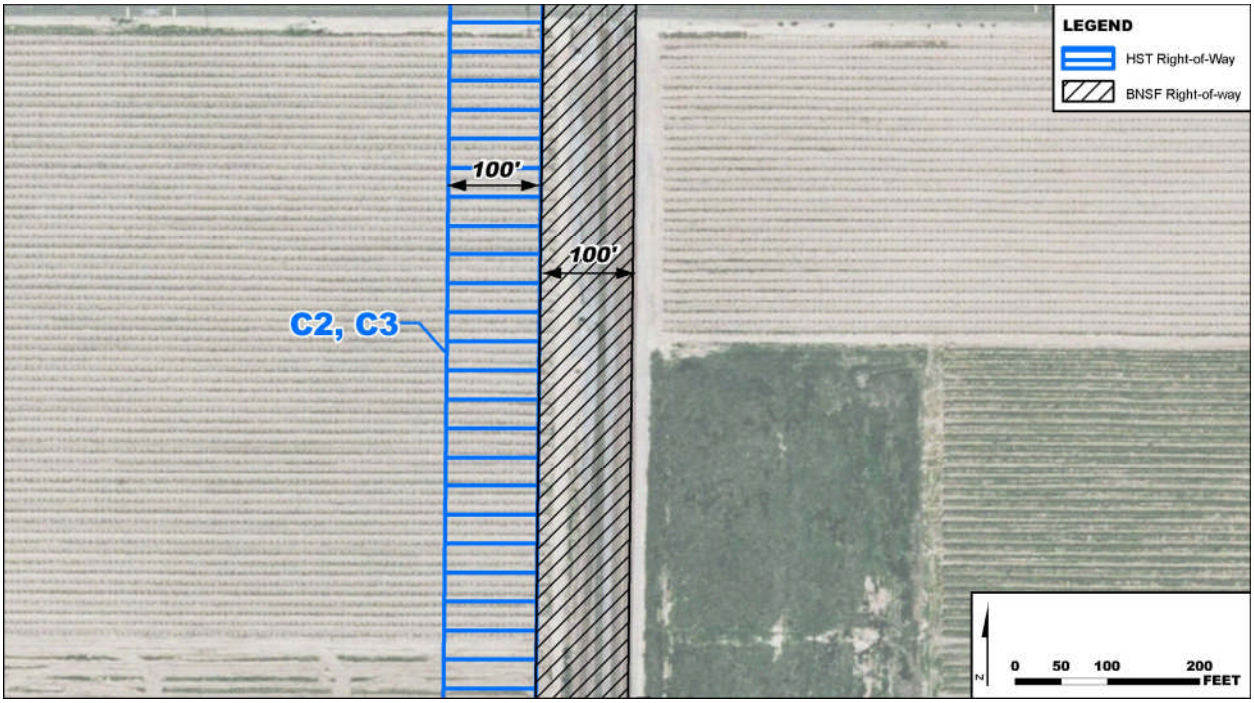


Figure 4-16. South of Fresno with a Separate Right-of-Way



The Corcoran through-town alignments CTT1A (At-Grade) and CTT1B (Elevated) would be constrained by rail-oriented agricultural businesses. (See Figure 4-17, Figure 4-18, and Figure 4-19.) There are numerous sidings, spurs throughout the town as well as an Amtrak station. Commercial and residential buildings immediately adjacent the BNSF would be heavily affected. Further, the at-grade option would require local street closures and/or grade-separations requiring displacement of adjacent property owners who would have access to their properties severed.

Figure 4-17. At-Grade Option on West Side of BNSF Tracks Looking North at Approximately Sherman Avenue

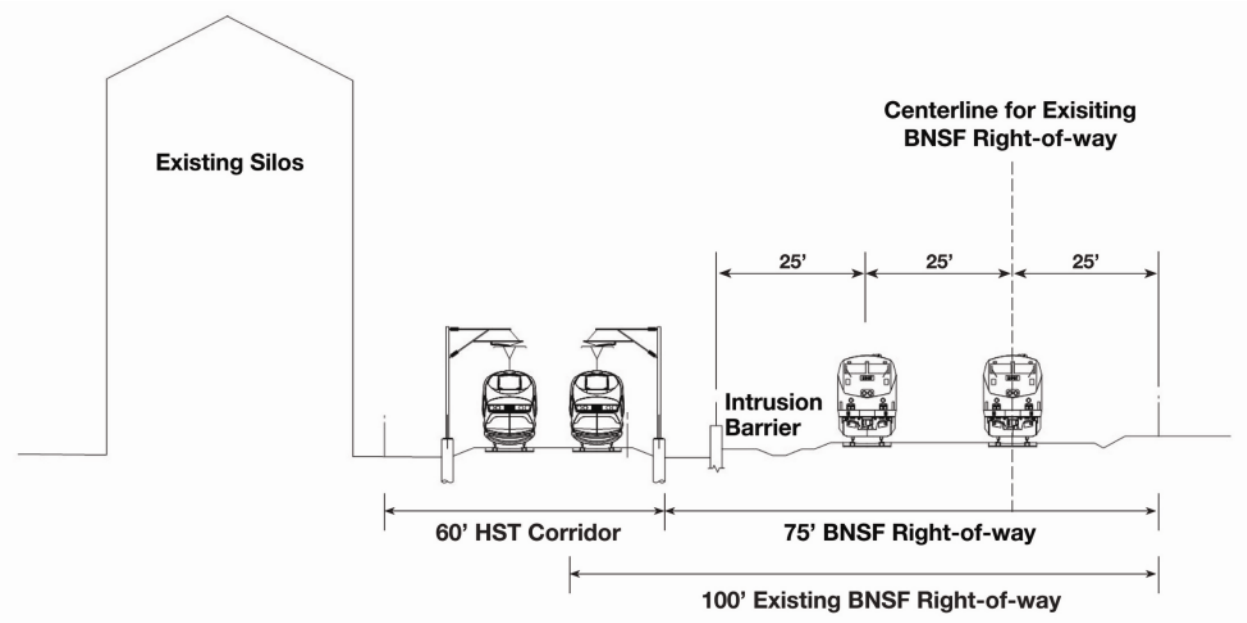


Figure 4-18. Local Options in Corcoran at South of Sherman Avenue

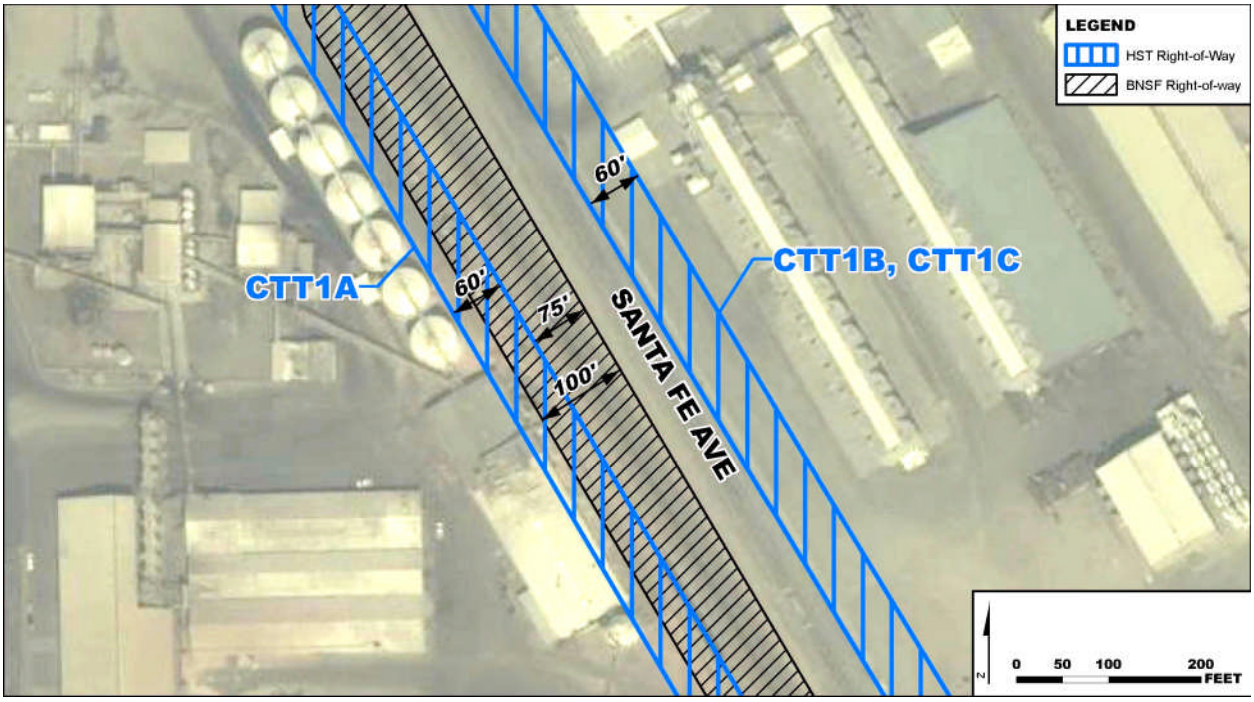
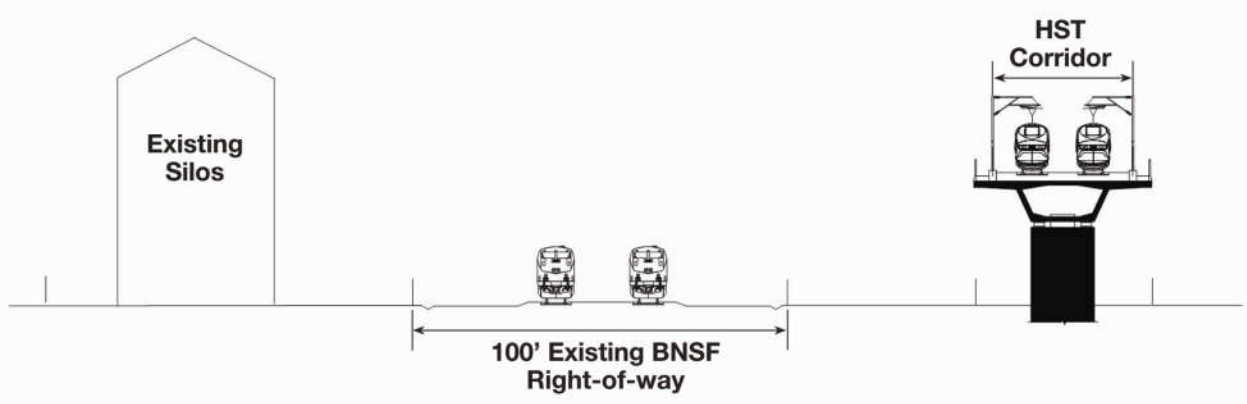


Figure 4-19. Elevated Alternative on East Side of Tracks Looking North at Approximately Sherman Avenue



(Note: HST viaduct could be moved closer to, or into BNSF right-of-way to suit the existing track layout.)

The Corcoran East Side Bypass (CTT1C), would affect agricultural land and operations, dividing parcels in a manner that could affect their economic viability.

C. BNSF Route – Corcoran to Wasco

For the west side alignments (C1, C2, C4, and C5) the at-grade profile would sever a variety of existing rail spurs. The BNSF alignment also has two curves in this area, where the geometry for the alignments would require them to deviate from their position adjacent to the BNSF. In these areas, there could be an advantage to relocating the BNSF tracks to follow the HST alignment to reduce overall land take.

Alignments to the east side of BNSF would also be east of SR-43, which would require new ramps from SR-43 to grade-separated overcrossings of the BNSF and HST. The space needed for these ramps would push the alignments as much as 300 feet from SR-43, resulting in additional land acquisition in the space between the BNSF right-of-way and SR-43.

Figure 4-20 shows the typical grade separation of a road over SR-43, BNSF, and HST for an east-side HST alignment (Alternatives C3 and C6).

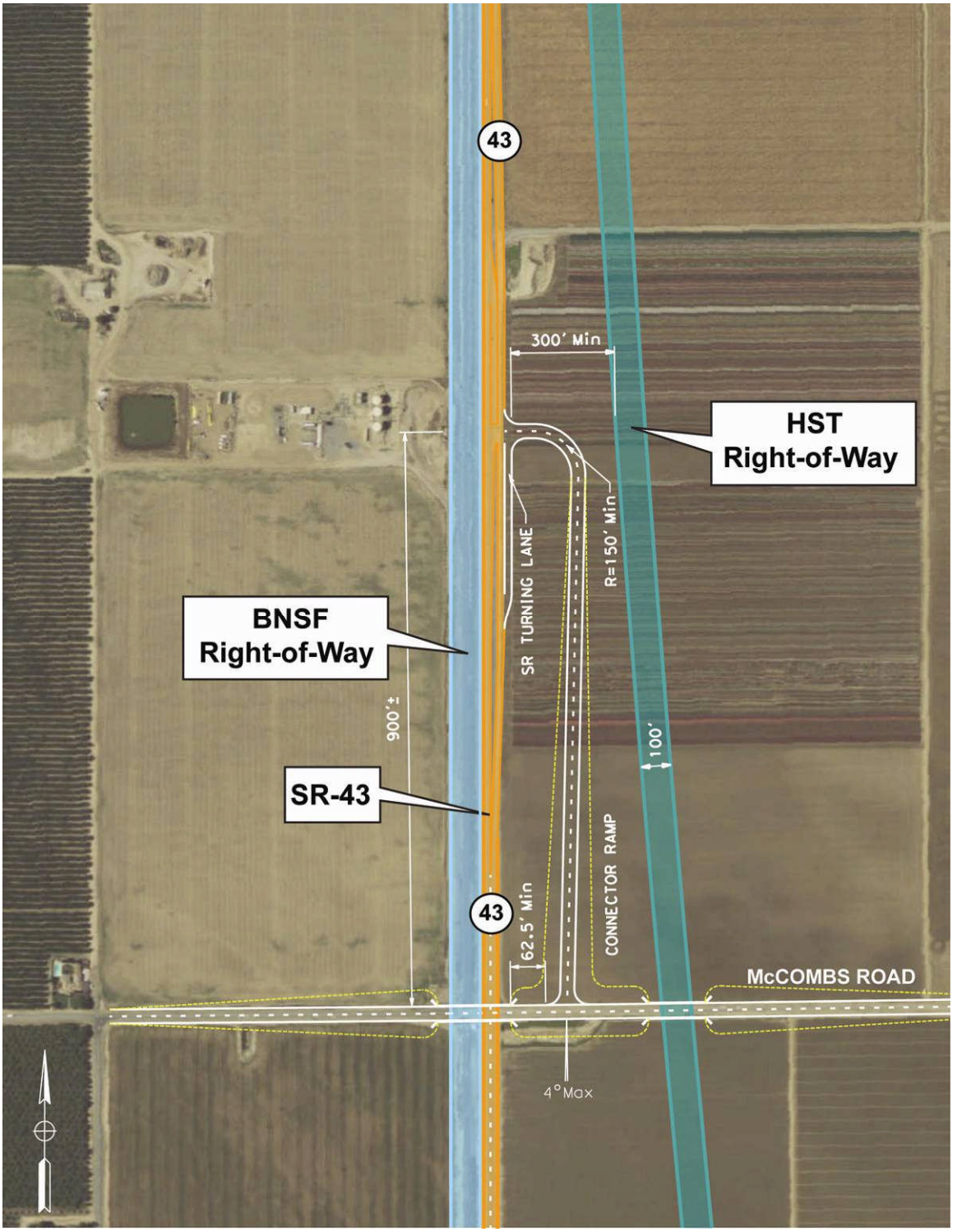
Alignments that continue close to BNSF would have potentially serious impacts on three important resources in this area: Pixley National Wildlife Refuge; Colonel Allensworth State Historic Park; and Allensworth Ecological Reserve. Alternatives C1, C2, C4, and C5 would affect the Colonel Allensworth State Historic Park and the Allensworth Ecological Reserve on the western side of the BNSF right-of-way. Alternative C3 would affect the Pixley National Wildlife Refuge and the Allensworth Ecological Reserve adjacent to SR-43. Alternative C6 would have impacts similar to those of C3, with an additional take of the Pixley National Wildlife Refuge where the alignments curve into the BNSF right-of-way.

D. BNSF Route – Wasco to Rosedale

Wasco

Wasco is an agricultural city with several active rail sidings. The BNSF tracks run on the eastern side of the town, serving sidings, spurs, and an Amtrak station. The city center, with commercial and residential buildings, is immediately west of the BNSF right-of-way and commercial and/or industrial buildings stand to the east. Alternatives that both pass through and bypass the city center were developed for this area.

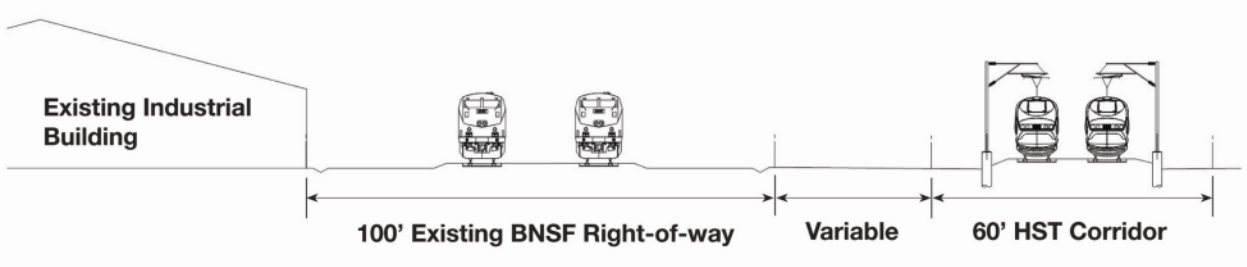
Figure 4-20. Typical Grade Separation, Local Road over BNSF, SR-43, and HST for East-Side HST Alignment (C3 and C6)



Alternatives C1, C2, C4, and C5 enter Wasco on the western side of the BNSF right-of-way, while Alternatives C3 and C6 enter on the eastern side. All the alternatives exit Wasco on the eastern side to negotiate the curve into Shafter.

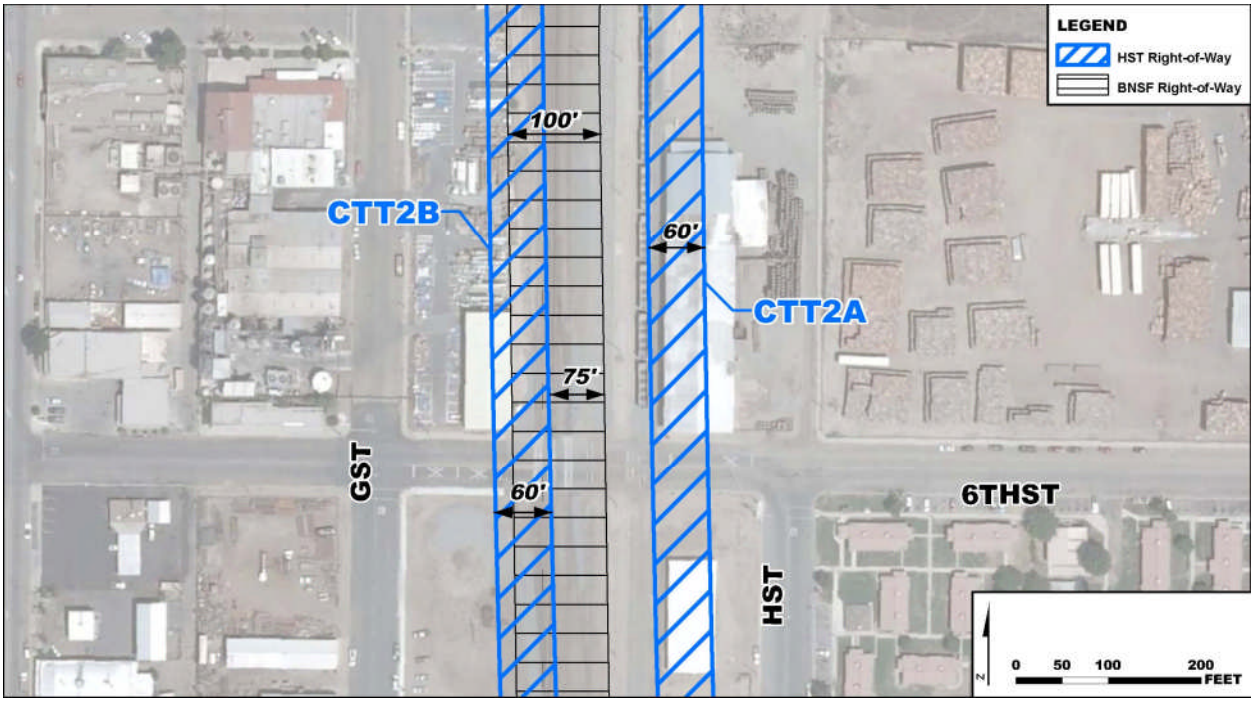
The Wasco Through-Town At-Grade Option (CTT2A, Figure 4-21, and Figure 4-22) would have a major impact on the BNSF sidings and spurs, and would require grade separations that would have a major impact on the existing road network. It would also create a noise and visual impact on the town, and would sever the eastern and western sides of the town. In addition, it pass near to an agricultural workers' compound on the eastern side of town, which could raise environmental justice issues.

Figure 4-21. At-Grade Alternative in Wasco on Eastern Side of BNSF Tracks Looking North at Approximately Sixth Street to Fourth Street



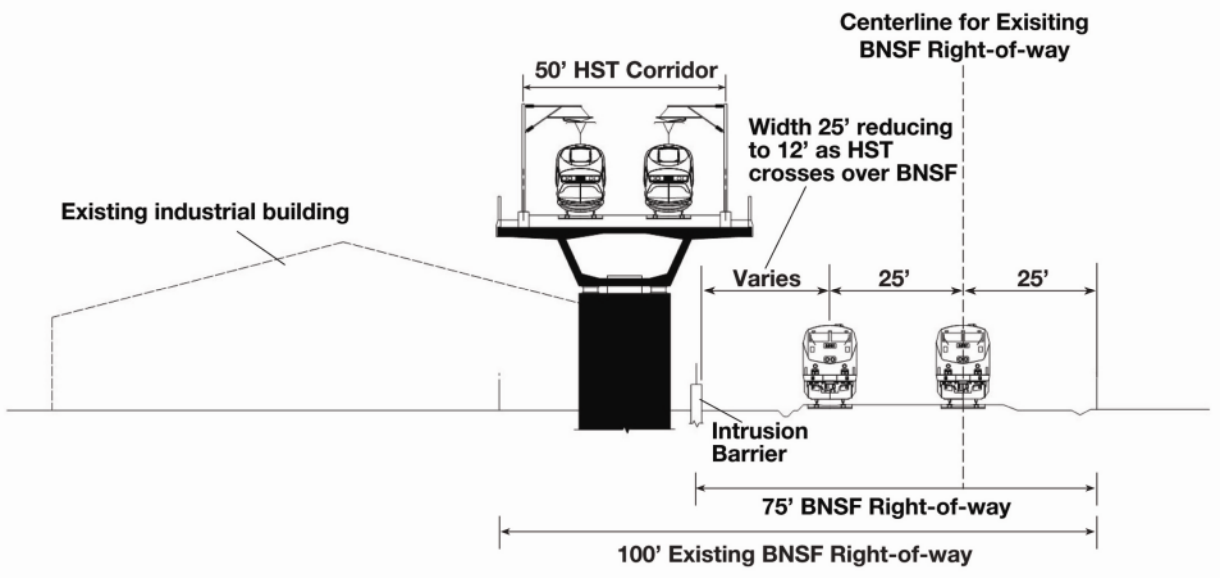
(Note: HST could be moved closer to, or into, BNSF right-of-way.)

Figure 4-22. Local Options in Wasco at Sixth Street



The Wasco Through-Town Elevated Option (CTT2B, Figure 4-23) would have reduced impacts on the BNSF facilities and would also avoid the need for grade separations. This option would, however, create greater noise and visual impacts, and would affect industrial buildings on the western side of the BNSF tracks.

Figure 4-23. Alternative CTT2B, Elevated, Crosses from West Side to East Side in Wasco Looking North at Approximately Fourth Street to Sixth Street



The two Wasco bypass options (CTT2C and CTT2D) would limit impacts on the existing road network but would also affect plans for the proposed Rose City Industrial Park to the east of Wasco and would have greater agricultural impacts.

Shafter

Shafter is an agricultural city with several active rail sidings. The BNSF right-of-way runs through the city, and the railroad serves sidings and spurs. Commercial and residential buildings are located immediately west of the BNSF right-of-way, and commercial and/or industrial buildings are on the east. Alternatives going through the center of the city, and bypass alternatives, were developed for the Shafter area.

Alternatives C1, C2, C4, and C5 enter Shafter on the eastern side of the BNSF right-of-way, while Alternatives C3 and C6 bypass the town to the east. All the alternatives exit Shafter adjacent to the BNSF tracks on the eastern side.

The Shafter Through-Town At-Grade Options (CTT2C and CTT2E, Figure 4-24 and Figure 4-25) would have a major impact on the BNSF sidings and spurs, particularly to the south of Shafter where there are existing customers and BNSF has plans for a new yard. They would also require separation of existing crossings, which would have a major impact on the existing road network. These options also would create noise and visual impacts in Shafter and would divide the east and west sides of the city. Some industrial buildings on the eastern side of the BNSF right-of-way would be affected.

Figure 4-24. At-Grade Alternative C1 in Shafter on Eastern Side of BNSF Tracks Looking North at Approximately Shafter Avenue to Lerdo Highway

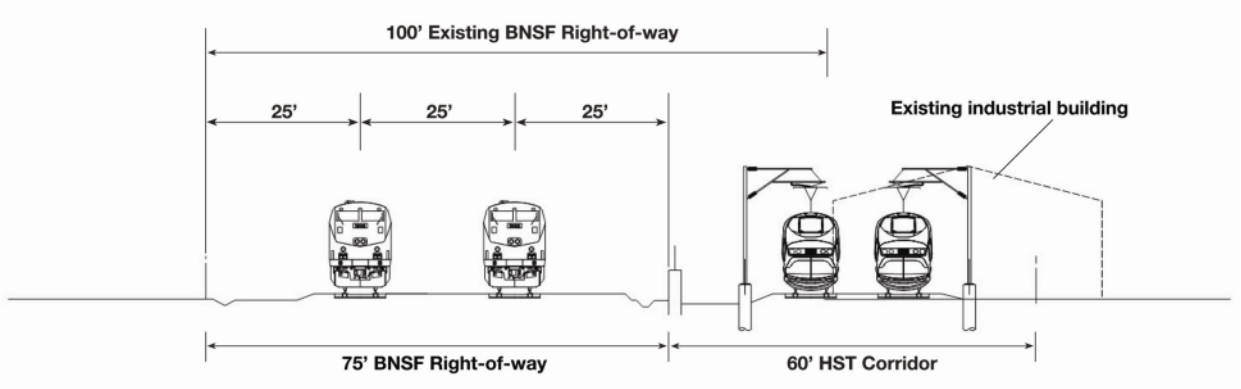
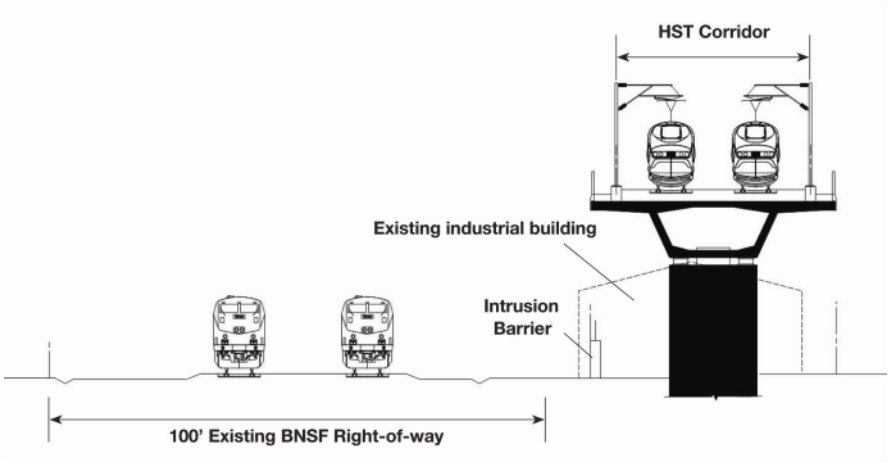


Figure 4-25. At-Grade Alternatives in Shafter on Eastern Side of BNSF Tracks

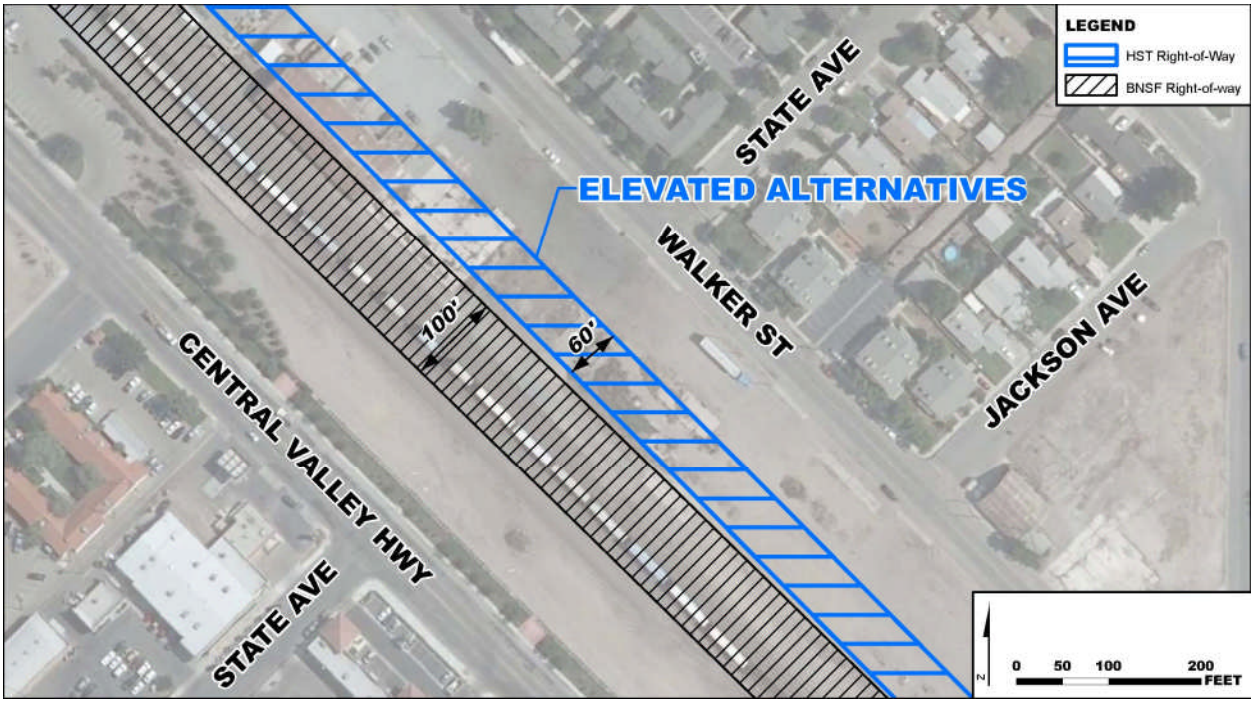
The Shafter Through-Town Elevated Options (CTT2B and CTT2F, Figure 4-26 and Figure 4-27) would have limited impact on BNSF facilities and virtually no effect on the existing road network, avoiding the need for grade separations. They would still have greater noise and visual impacts than the at-grade options.

Figure 4-26. Elevated Alternative that Crosses from Western to Eastern Side in Shafter



(Note: HST could be moved closer to, or into BNSF right-of-way. This requires further discussions with BNSF.)

Figure 4-27. Elevated Alternative On Western Side of BNSF in Shafter



The Shafter Bypass At-Grade Options (CTT2D and CTT2G) would result in fewer impacts to the town and the residents, but have considerably greatrer impacts on agricultural land and operations.

The Wasco-Shafter-7th Standards Road Bypass Option (CTT2G) is farther to the east than CTT2D in order to minimize impacts on planned industrial development south of Shafter and reduce the amount of elevated construction required. Conversely, agricultural impacts are much greater under this alternative, which also bisects a planned 1,600-acre mixed-use development south of 7th Standard Road.

4.2.3. Recommendations for Rural Subsection

Based on the evaluation described above it is recommended that Alignment Alternative C1 (BNSF West – Shared Right-of-Way) should be carried forward into the environmental review and preliminary design processes. In addition, four local options are also recommended: CTT1B (Corcoran Through Town Elevated), CTT1C (Corcoran East Bypass At-Grade), CTT2B (Wasco-Shafter Through Town Elevated), and CTT2D (Wasco-Shafter East Bypass At-Grade).

After reviewing the alignment alternatives and associated local options, a new local option (Allensworth Bypass, CAAA) has been defined specifically to avoid Section 4(f) and Section 6(f) resources (Allensworth State Historic Park, Pixley National Wildlife Refuge and the Allensworth Ecological Reserve). It is recommended that this alternative be carried forward as well.

Table 4-12 summarizes the findings, and Figure 4-28 shows those Rural Subsection alternatives and options recommended to be carried forward.

Table 4-12. Alternatives Evaluation Analysis – Rural Subsection

Alt.	Alignment	Evaluation Findings	Recommendation
C1	BNSF West – Shared right-of-way	▪ Provides station in Visalia-Tulare-Hanford area. ▪ Maximizes use of shared right-of-way with BNSF. ▪ Remains largely within existing transportation corridor. ▪ Shorter alignment than Visalia station alternatives.	Carry Forward
C2	BNSF West – Separate right-of-way	▪ Similar to Alternative C1, but with greater land use impacts as a result of shifting to land outside of the BNSF right-of-way.	Not Carry Forward
C3	BNSF East – Separate right-of-way	▪ Does not follow the Authority's objective to maximize use of existing transportation corridors ▪ Minimizes impact on the Colonel Allensworth State Historic Park ▪ Isolates tract of land between SR 43 and the HST right-of-way, which would require acquisition of excess land ▪ Impinges on the Pixley National Wildlife Refuge ▪ Increases impacts on the Allensworth Ecological Reserve	Not Carry Forward
C4	Visalia station route west side – Shared right-of-way	▪ Longer route than BNSF alternatives, therefore longer travel time, which could affect the mandated 2 hour 40 minute travel time from San Francisco to Los Angeles. ▪ Partially follows the Authority's objective to maximize use of existing transportation corridors ▪ Long stretch of Greenfield alignment away from existing freight rail corridor.	Not Carry Forward
C5	Visalia station route west side – separate right-of-way	▪ Longer route than BNSF alternatives, therefore longer travel time, which could affect the mandated 2 hour 40 minute travel time from San Francisco to Los Angeles. ▪ Does not follow the Authority's objective to maximize use of existing transportation corridors ▪ Long length of Greenfield alignment.	Not Carry Forward
C6	Visalia station route east side – separate right-of-way	▪ Longer route than BNSF alternatives, therefore longer travel time, which could affect the mandated 2 hour 40 minute travel time from San Francisco to Los Angeles. ▪ Does not follow the Authority's objective to maximize use of existing transportation corridors. ▪ Long stretch of Greenfield alignment away from existing freight rail corridor.	Not Carry Forward

Table 4-12. Alternatives Evaluation Analysis – Rural Subsection

Alt.	Alignment	Evaluation Findings	Recommendation
▪ Hanford Alignment			
CPAA	West bypass of Hanford – no station	▪ Does not provide potential station in Visalia-Tulare-Hanford area. ▪ Does not follow the Authority's objective to maximize use of existing transportation corridors. ▪ Greater length of greenfield alignment away from existing freight rail corridor. ▪ Conflicts with existing and planned development. ▪ Not supported by the community.	Not Carry Forward
▪ Corcoran Options			
CTT1A	At-grade through town	▪ Major impacts to existing road network. ▪ Impacts on BNSF tracks. ▪ Requires relocation of Amtrak station. ▪ Divides Corcoran.	Not Carry Forward
CTT1B	Elevated through town	▪ Reduces impact on BNSF facilities. ▪ Reduces impact on existing road network. ▪ Reduces community severance. ▪ Minimizes agricultural impacts.	Carry Forward
CTT1C	Bypass	▪ Reduces impact on town. ▪ Supported by community.	Carry Forward
▪ Fowler, Selma, Kingsburg Bypass Options			
CBPA	Bypass via Greenfield west of towns	▪ Eliminated as a result of the elimination of Alternatives C4, C5, and C6.	Not Carry Forward
CBPB	Bypass just west of town limits		Not Carry Forward
▪ Visalia Station Alignment Options			
CVSA	198 East	▪ Alignment needed to serve a Visalia station would require longer travel time. ▪ Imposes disproportionate impacts to agricultural land. ▪ Inconsistent with the Program EIR/EIS Preferred Alignment.	Not Carry Forward
CVSB	99 Center (South of SR-198)		Not Carry Forward
CVSC	99 North (Goshen)		Not Carry Forward
▪ Wasco and Shafter Options			
CTT2A	Wasco and Shafter at-grade	▪ Would require new grade separated crossings to avoid major impacts on existing road network. ▪ Impacts on BNSF operations. ▪ Requires relocation of Amtrak station. ▪ Divides both Wasco and Shafter.	Not Carry Forward
CTT2B	Wasco and Shafter elevated	▪ Reduced impact on BNSF facilities. ▪ Reduced impact on existing road network. ▪ Reduced community severance. ▪ Minimizes agricultural impacts.	Carry Forward
CTT2C	Bypass of Wasco, at-grade through Shafter	▪ Major impacts on existing road network in Shafter. ▪ Impacts on BNSF operations. ▪ Divides Shafter.	Not Carry Forward
CTT2D	Bypass of Wasco and Shafter	▪ Reduces impact on towns. ▪ Supported by communities.	Carry Forward

Table 4-12. Alternatives Evaluation Analysis – Rural Subsection

Alt.	Alignment	Evaluation Findings	Recommendation
CTT2E	Elevated through Wasco, at-grade through Shafter	▪ Major impacts on existing road network in Shafter. ▪ Impacts on BNSF operations. ▪ Divides Shafter.	Not Carry Forward
CTT2F	At-grade through Wasco, elevated through Shafter	▪ Major impacts on existing road network in Wasco. ▪ Impacts on BNSF operations. ▪ Divides Wasco.	Not Carry Forward
CTT2G	7th Standard Road East Bypass	▪ Major impact on agriculture and planned mixed use development. ▪ Possible impact on 7th Standard Road reconstruction. ▪ Not supported by City of Bakersfield.	Not Carry Forward

Figure 4-28. Alternatives and Options Carried Forward – Rural Subsection

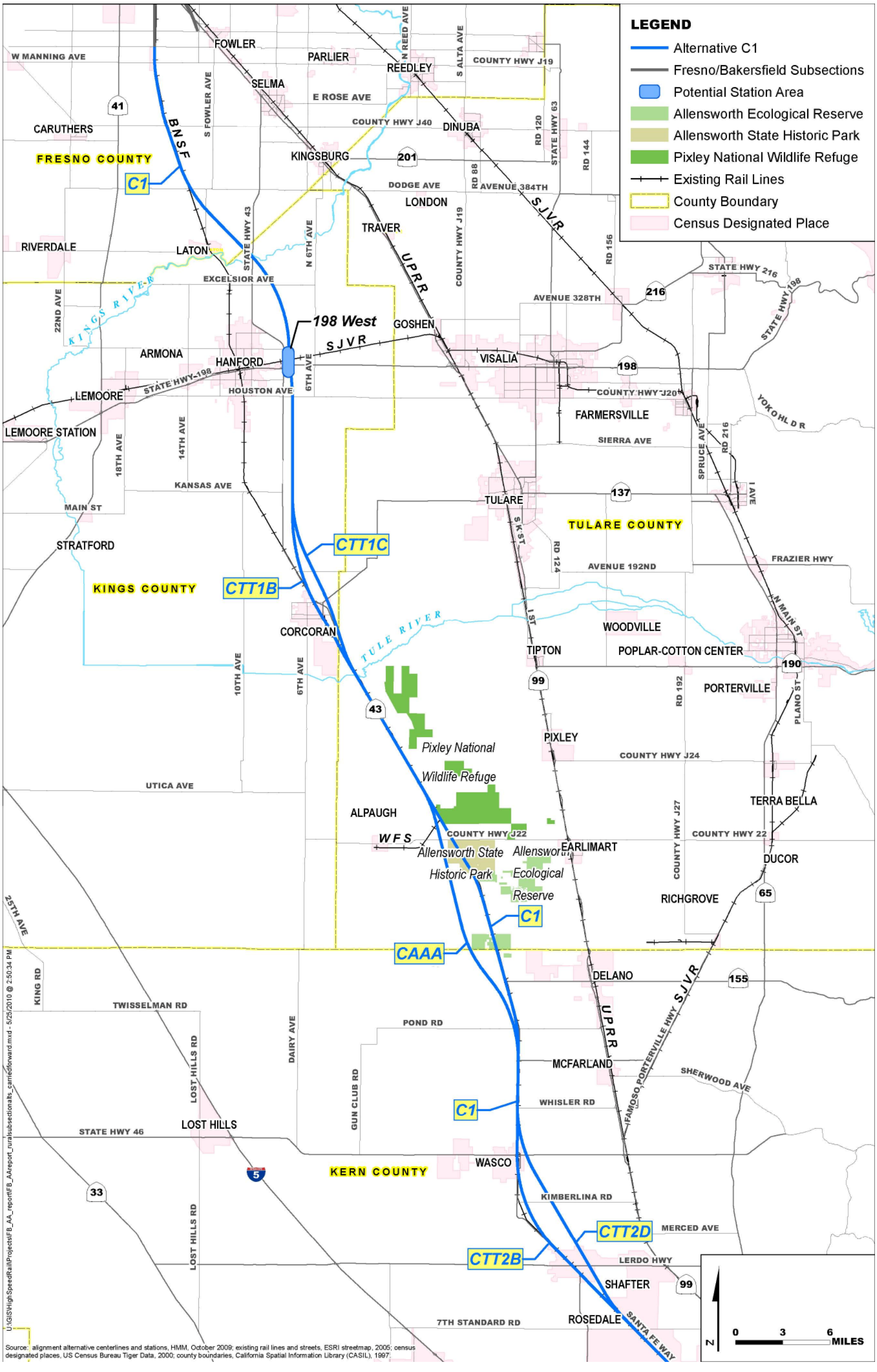


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Table 4-7. Rural Subsection – Comparison of End-to-End Alignment Alternatives By Route

Category	Measurement	BNSF Route Via Hanford, Corcoran, Wasco, and Shafter			UPRR/BNSF Route Via Visalia, Wasco, and Shafter		
		BNSF Shared ROW (C1)	BNSF West Side (C2)	BNSF East Side (C3)	BNSF Shared ROW (C4)	BNSF West Side (C5)	BNSF East Side (C6)
Disruption to Communities	**Displacements**	Crosses: ▪ 342 agricultural parcels (929 acres) ▪ 3 residential parcels (<1 acre) ▪ 1 commercial parcel (<1 acre) ▪ 74 industrial parcels (43 acres)	Crosses: ▪ 327 agricultural parcels (972 acres) ▪ 4 residential parcels (1 acre) ▪ 1 commercial parcel (< 1 acre) ▪ 76 industrial parcels (51 acres)	Crosses: ▪ 341 agricultural parcels (1,046 acres) ▪ 6 residential parcels (1 acre) ▪ 2 commercial parcels (1 acre) ▪ 29 industrial parcels (25 acres)	Crosses: ▪ 394 agricultural parcels (1,017 acres) ▪ 3 residential parcels (<1 acre) ▪ No commercial parcels ▪ 46 industrial parcels (27 acres)	Crosses: ▪ 383 agricultural parcels (1,051 acres) ▪ 3 residential parcels (< 1 acre) ▪ No commercial parcels ▪ 48 industrial parcels (33 acres)	Crosses: ▪ 382 agricultural parcels (1,088 acres) ▪ 8 residential parcels (1 acre) ▪ 1 commercial parcel (< 1 acre) ▪ 27 industrial parcels (22 acres)
	Properties with access affected	Would affect properties in Shafter, Wasco, and Corcoran.	Similar to C1.	Would affect properties only in Shafter.	Would affect properties in Shafter and Wasco.		
	Local traffic effects around stations	Convenient and direct access to major thoroughfares (SR-198 and SR-99).			Convenient and direct access to major thoroughfares (SR-198 and SR-99), except for 99 Center.		
	Local traffic effects at grade separations	Change in Level of Service not expected to have large impact on local traffic.					
Design Objectives	**Travel time (220 mph)**	25 minutes, 22 seconds.			25 minutes 35 seconds, the longest of the alternatives.		
	Route length	93.0 miles			93.8 miles		
	Intermodal connections	▪ Potential opportunity to establish connection with future east-west commuter service on Cross-Valley RR line.			▪ 99 North – Potential opportunity to establish connection with future east-west commuter service on Cross-Valley RR line near Goshen. ▪ 99 Center and 198 East - No foreseeable connections other than new routing of local transit lines.		
	Capital costs	Construction similar. Lowest right-of-way costs. Requires: • 3 BNSF crossings • Extended intrusion barrier • Elevated structures through Corcoran, Wasco, and Shafter.	Construction similar. Higher right-of-way costs. Requires: • 3 BNSF crossings • No intrusion barrier Elevated structures through Corcoran, Wasco, and Shafter.	Construction similar. Higher right-of-way costs. Requires: • 3 BNSF crossings • Extended intrusion barrier At grade throughout	Lower than C3. Requires: • 2 BNSF crossings • Possible intrusion barrier south of Allensworth	Lower than C4. Requires: • 2 BNSF crossings • Possible intrusion barrier south of Allensworth	Lowest overall. No freight rail crossings required. Possible intrusion barrier south of Allensworth.
	Operating costs	▪ Similar for C1–C3 alternatives.			▪ Similar for C4–C6 alternatives ▪ Approximately 1.7% longer than C1–C3, resulting in a small increase in operational cost.		
	Maintenance costs	▪ Slightly higher than C3. ▪ Close to the BNSF right-of-way and not parallel to existing highways, which reduces availability of working space next to the HST alignment. ▪ 3 BNSF crossings. ▪ Extensive intrusion barrier and detectors.	▪ Slightly higher than C3. ▪ Well spaced from the BNSF, but generally on opposite side of BNSF from existing major highways. ▪ 3 BNSF crossings. ▪ At-grade in separate right-of-way. ▪ Lower detection requirements and lower maintenance costs.	▪ Lowest overall. ▪ Generally alongside SR-43 south of Hanford, with straightforward access. ▪ At-grade in separate right-of-way. ▪ Lower detection requirements and lower maintenance costs.	▪ Similar for all C4–C6 alternatives.		
Land Use	**Potential for Transit Oriented Development**	▪ Potential Hanford station location falls within jurisdictions of the City of Hanford and of Kings County. Hanford General Plan designates over 100 acres to the east of the alignment and 60 acres to the west as Planned Highway Development, which anticipates development oriented to highway travelers. City intends to prepare area plan for this area and will further require that developers prepare a detailed plan for City approval. Given the City's intent to prepare a focused plan for the area, there could be an opportunity to adapt proposed development to support a rail station. Conversely, Kings County has zoned the unincorporated portion of this station site as agricultural.			▪ 99 North – Potential station location falls within unincorporated Tulare County, in an area designated for mix of industrial and commercial uses. Area appears constrained for TOD by the junction of the railroad tracks, as well as pattern of existing uses to the northwest and south. ▪ 99 Center - The City of Visalia's current zoning designation for this area is quasi-public in the northwest section and agricultural for the remaining areas. Existing land use includes the City of Visalia's water treatment plant and agricultural uses. TOD opportunities appear limited based on existing and planned uses. ▪ 198 East – Limited opportunity for TOD. Potential station location in unincorporated Tulare County on land designated as Valley Agriculture. Area falls beyond the City of Visalia's Urban Area Boundary.		
	Consistency with other planning efforts	▪ Traverses designated agricultural land. ▪ Fewer right-of-way needs	▪ Traverses more designated agricultural land than C1. ▪ Greater right-of-way needs.	▪ Traverses designated agricultural land. ▪ Greater right-of-way needs. ▪ Farther east through Wasco than C1, C2, C4, and C5, impacting fewer urban developments, but more impacts on agricultural land. ▪ Sensitive land use impacts in North	▪ Traverses designated agricultural land (valley agricultural for Tulare). ▪ Some sensitive land use and community impacts through Wasco and North Shafter.	▪ Traverses designated agricultural land (valley agricultural for Tulare). ▪ Farther east through Wasco than C1, C2, C4, C5, impacting fewer urban developments. ▪ Sensitive land use impacts in North Shafter.	

Table 4-7. Rural Subsection – Comparison of End-to-End Alignment Alternatives By Route

Category	Measurement	BNSF Route Via Hanford, Corcoran, Wasco, and Shafter			UPRR/BNSF Route Via Visalia, Wasco, and Shafter		
		BNSF Shared ROW (C1)	BNSF West Side (C2)	BNSF East Side (C3)	BNSF Shared ROW (C4)	BNSF West Side (C5)	BNSF East Side (C6)
				Shafter.			
Constructability	**Constructability**	▪ Closest to the BNSF. ▪ Construction adjacent to BNSF restricted, but may be offset by reduced impact on neighbors to the west. ▪ Access difficult: o accessible only from west due to proximity to BNSF o Alignment is away from ready access from SR-43.	▪ Construction simpler than C1 because of greater distance from BNSF. ▪ Access constraints are similar to C1, but most construction unconstrained by BNSF operations.	▪ Construction alongside SR-43 and in rural areas would be simple. ▪ Access readily available from SR-43 south of SR-198.	▪ Construction restricted south of Allensworth by BNSF, as for C1. North of Allensworth, construction simple. ▪ North of Allensworth access available via existing road network. Access restricted south of Allensworth, as for C1 and C2.	▪ Construction south of Allensworth less restricted than C4. ▪ Access similar to C4, but most construction unconstrained by BNSF operations.	▪ Construction alongside SR-43 and in rural areas would be simple. ▪ Access available from SR-43 south of Allensworth and via the rural road network north.
	Disruption to existing railroads	▪ Impacts BNSF line operations and freight facilities adjacent to BNSF. ▪ Conflicts with freight facilities at Crome, Shafter, Stoil, Angolia, Corcoran, and Bowles. Approximately 25 lines. ▪ Wasco & Shafter bypass (local option CTT2D) retains the connection to the 14 sidings south of Shafter.	▪ Greater impact on facilities adjacent to BNSF. ▪ Conflicts with freight facilities at Crome, Shafter, Stoil, Angolia, Corcoran, and Bowles. Approximately 25 lines. ▪ Wasco & Shafter bypass (local option CTT2D) retains the connection to the 14 sidings south of Shafter.	▪ Severs existing rail spurs. ▪ Conflicts with freight facilities at Crome, Shafter, Conejo, and Monmouth. Approximately 19 lines (of which 14 are immediately south of Shafter). ▪ Wasco & Shafter bypass (local option CTT2D) retains the connection to the 14 sidings south of Shafter.	▪ Impacts BNSF line operations and the freight facilities west of BNSF south of Allensworth. ▪ Conflicts with freight facilities at Crome and Shafter. Approximately 17 lines. ▪ Wasco & Shafter bypass (local option CTT2D) retains the connection to the 14 sidings south of Shafter.		▪ Severs existing rail spurs. ▪ Conflicts with freight facilities at Crome and Shafter. Approximately 19 lines (of which 14 are immediately south of Shafter). ▪ Wasco & Shafter bypass (option CTT2D) retains the connection to the 14 sidings south of Shafter.
	Disruption to and relocation of utilities	▪ Crosses 51 utilities: ▪ 18 electric transmission lines ▪ 8 natural gas lines ▪ 7 storm drains ▪ 10 water lines ▪ 4 sewer lines ▪ 4 crude oil pipelines	Crosses 44 utilities: ▪ 18 electric transmission lines ▪ 8 natural gas lines ▪ 4 storm drains ▪ 6 water lines ▪ 4 sewer lines ▪ 4 crude oil pipelines	Crosses 31 utilities: ▪ 17 electric transmission lines ▪ 9 natural gas lines ▪ 1 water line ▪ 4 crude oil pipelines	Crosses 46 utilities: ▪ 12 electric transmission lines ▪ 8 natural gas lines ▪ 7 storm drains ▪ 10 water lines ▪ 4 sewer lines ▪ 4 crude oil pipelines ▪ 1 planned gas line	Crosses 39 utilities: ▪ 12 electric transmission lines ▪ 8 natural gas lines ▪ 4 storm drains ▪ 6 water lines ▪ 4 sewer lines ▪ 4 crude oil pipelines ▪ 1 planned gas line	Crosses 26 utilities: ▪ 12 electric transmission lines ▪ 8 natural gas lines ▪ 1 water line ▪ 4 crude oil pipelines ▪ 1 planned gas line
Environmental Resources	**Waterways/ Sensitive Habitat Areas**	▪ Crosses 8 waterways (21–146 feet wide) between Laton and Wasco: ▪ Kings River ▪ Tule River ▪ Poso Creek.			Crosses 10 waterways (21–235 feet wide) between Laton and Wasco: ▪ Kings River ▪ Tule River White Rivers.		
		Crosses 73 acres of wetland habitat: ▪ 52 acres of vernal pool complex areas ▪ 16 acres within an irrigation basin ▪ 5 acres of freshwater ponds, emergent/irrigation ponds, shrub wetlands, and riverine habitat.	Crosses 81 acres of wetland habitat: ▪ 56 acres of vernal pool complex areas ▪ 17 acres within an irrigation basin ▪ 8 acres of freshwater ponds, emergent/irrigation ponds, shrub wetlands, and riverine habitat.	Crosses 84 acres of wetland habitat: ▪ 59 acres of vernal pool complex areas ▪ 8 acres within an irrigation basin ▪ 6 acres of freshwater emergent wetland ▪ 11 acres of freshwater ponds, shrub wetlands, and riverine habitat	Crosses 50 acres of wetland habitat: ▪ 44 acres of vernal pool complex ▪ 6 acres of freshwater/irrigation ponds, emergent and shrub wetlands, and riverine habitat	Crosses 52 acres of wetland habitat: ▪ 43 acres of vernal pool complex ▪ 9 acres of freshwater ponds, emergent/ irrigation ponds, shrub wetlands, and riverine habitat	Crosses 68 acres of wetland habitat: ▪ 55 acres of vernal pool complex areas ▪ 5 acres of freshwater emergent wetlands ▪ 8 acres of freshwater ponds, emergent/irrigation ponds, shrub wetlands, and riverine habitat
		Crosses no designated critical habitat. .		Crosses 28 acres of USFWS-designated critical habitat for vernal pool fairy shrimp.	Crosses 31 acres of USFWS- designated critical habitat for 3 species: ▪ vernal pool fairy shrimp, ▪ tadpole shrimp, and ▪ California tiger salamander.	▪ Crosses 30 acres of USFWS-designated critical habitat for 3 species: ▪ vernal pool fairy shrimp, ▪ tadpole shrimp, and ▪ California tiger salamander.	▪ Crosses 46 acres of USFWS-designated critical habitat for 3 species: ▪ vernal pool fairy shrimp, ▪ tadpole shrimp, and ▪ California tiger salamander
		Impacts 189 acres and 7 threatened or endangered species: ▪ San Joaquin Kit Fox ▪ Swainson's Hawk ▪ Tipton kangaroo rat ▪ Blunt-nosed leopard lizard ▪ Kern mallow ▪ California jewel-flower ▪ San Joaquin woollythreads	Impacts 190 acres and 7 threatened or endangered species: ▪ San Joaquin Kit Fox ▪ Swainson's Hawk ▪ Tipton kangaroo rat ▪ Blunt-nosed leopard lizard ▪ Kern mallow ▪ California jewel-flower ▪ San Joaquin woollythreads	Impacts 172 acres and 7 threatened or endangered species: ▪ San Joaquin Kit Fox ▪ Swainson's Hawk ▪ Tipton kangaroo rat ▪ Blunt-nosed leopard lizard ▪ Kern mallow ▪ California jewel-flower ▪ San Joaquin woollythreads	Impacts 213 acres and 7 threatened or endangered species: ▪ California tiger salamander ▪ San Joaquin Kit Fox ▪ Tipton kangaroo rat ▪ Blunt-nosed leopard lizard ▪ Kern mallow ▪ California jewel-flower ▪ San Joaquin woollythreads	Impacts 175 acres and 7 threatened or endangered species: ▪ California tiger salamander ▪ San Joaquin Kit Fox ▪ Tipton kangaroo rat ▪ Blunt-nosed leopard lizard ▪ Kern mallow ▪ California jewel-flower ▪ San Joaquin woollythreads	Impacts 194 acres and 7 threatened or endangered species: ▪ California tiger salamander ▪ San Joaquin Kit Fox ▪ Tipton kangaroo rat ▪ Blunt-nosed leopard lizard ▪ Kern mallow ▪ California jewel-flower ▪ San Joaquin woollythreads

Table 4-7. Rural Subsection – Comparison of End-to-End Alignment Alternatives By Route

Category	Measurement	BNSF Route Via Hanford, Corcoran, Wasco, and Shafter			UPRR/BNSF Route Via Visalia, Wasco, and Shafter		
		BNSF Shared ROW (C1)	BNSF West Side (C2)	BNSF East Side (C3)	BNSF Shared ROW (C4)	BNSF West Side (C5)	BNSF East Side (C6)
	Cultural Resources	No impacts to National Register of Historic Places-listed properties. Four historic properties reported in the CHRIS database, in general areas of Bowles, Corcoran, and Rosedale.			No impacts to National Register of Historic Places-listed properties. Two historic properties reported in the CHRIS database, in the general areas of Delano and Rosedale.		
	Parklands	Directly impacts Colonel Allensworth State Historic Park (3 acres). 5 parks within a quarter-mile of alignment.	Directly impacts Colonel Allensworth State Historic Park (8 acres). Indirect impacts similar to C1.	Directly impacts Pixley National Wildlife Refuge and Colonel Allensworth State Historic Park (46 acres). Indirect impacts similar to C1.	Directly impacts Pixley National Wildlife Refuge and Colonel Allensworth State Historic Park (18 acres). 2 parks within a quarter-mile of alignment.	Directly impacts Pixley National Wildlife Refuge and Colonel Allensworth State Historic Park (23 acres). Indirect impacts similar to C4.	Directly impacts Pixley National Wildlife Refuge and Colonel Allensworth State Historic Park (48 acres). Indirect impacts similar to C4.
	Agricultural lands	Traverses 796 acres of important farmland, 442 classified as prime.	Traverses 803 acres of important farmland, 441 classified as prime.	Traverses 922 acres of important farmland, 471 classified as prime.	Traverses 932 acres of important farmland, 649 classified as prime.	Traverses 938 acres of important farmland, 652 classified as prime.	Traverses 988 acres of important farmland, 683 classified as prime.
	Noise and vibration	898 sensitive noise receivers: ▪ 874 residential parcels ▪ 14 churches ▪ 2 historic sites ▪ 2 libraries ▪ 2 city halls ▪ 4 schools 35 sensitive vibration receptors within 275 feet: ▪ 32 residential parcels ▪ 3 churches	909 sensitive noise receptors: ▪ 886 residential parcels ▪ 14 churches ▪ 2 historic sites ▪ 2 libraries ▪ 2 city halls ▪ 3 schools ▪ 45 sensitive vibration receptors within 275 feet: ▪ 43 residential parcels ▪ 2 churches	277 sensitive noise receptors: ▪ 263 residential parcels ▪ 9 churches ▪ 2 historic sites ▪ 1 library ▪ 2 schools 18 sensitive vibration receptors within 275 feet: ▪ 16 residential parcels ▪ 2 churches	▪ 609 sensitive noise receptors: ▪ 589 residential parcels ▪ 12 churches ▪ 2 historic sites ▪ 1 library ▪ 1 city hall ▪ 4 schools 15 sensitive vibration receptors within 275 feet: ▪ 13 residential parcels ▪ 2 churches	624 sensitive noise receptors: ▪ 605 residential parcels ▪ 12 churches ▪ 2 historic sites ▪ 1 library ▪ 1 city hall ▪ 3 schools 23 sensitive vibration receptors within 275 feet: ▪ 21 residential parcels ▪ 2 churches	251 sensitive noise receptors: ▪ 238 residential parcels ▪ 8 churches ▪ 2 historic sites ▪ 1 library ▪ 2 schools 18 sensitive vibration receptors within 275 feet: ▪ 16 residential parcels ▪ 2 churches
	Visual/scenic resources	▪ Visual impact slightly less than C2. ▪ 719 residential parcels within a quarter-mile of the alignment's elevated structures.	▪ Greatest visual impact. ▪ 762 residential parcels within a quarter-mile of the alignment's elevated structures.	▪ Visual impact slightly greater than C6. ▪ 17 residential parcels within a quarter-mile of the alignment's elevated structures.	▪ Medium visual impact. ▪ 440 residential parcels within a quarter-mile of the alignment's elevated structures.	▪ Medium visual impact ▪ 484 residential parcels within a quarter-mile of alignment's elevated structures.	▪ Least substantial impact. ▪ 6 residential parcels within a quarter-mile of the alignment's elevated structures.
	Geotechnical constraints	Crosses 1 concealed quaternary fault, just west of McFarland. No areas of documented high landslide susceptibility are within the alignment.					
		193 acres of highly erodible soils (K Factor > 0.4) along alignment.	194 acres of highly erodible soils (K Factor > 0.4) along alignment.	72 acres of highly erodible soils (K Factor > 0.4) located near Traver and south of Corcoran.	73 acres of highly erodible soils (K Factor > 0.4) located near Traver and south of Corcoran.	72 acres of highly erodible soils (K Factor > 0.4) located near Travers and south of Corcoran	66 acres of highly erodible soils (K Factor > 0.4) located near Traver and south of Corcoran.
	Hazardous materials	3 hazardous materials sites (most)	3 hazardous materials sites (most)	2 hazardous materials sites	2 hazardous materials sites	2 hazardous materials sites	1 hazardous materials site (least)

Note: Dark gray shading in the table Header indicates which alternatives were not recommended to be carried forward to the environmental review. Gray shading in the table body indicates the reason for that recommendation.

Table 4-8. Summary Comparison of Corcoran Options

Category	Measurement	Through Town, At-Grade, West Side of BNSF (CTT1A)	Through Town Elevated, East Side of BNSF (CTT1B)	Bypass East of Town, At-Grade (CTT1C)
Disruption to Communities	**Displacements**	Alignment crosses: • 54 agricultural parcels (176 acres) • 2 residential parcels • 0 commercial parcels • 25 industrial parcels (14 acres)	Alignment crosses: • 47 agricultural parcels (172 acres) • 1 residential parcel • 0 commercial parcels • 7 industrial parcels (14 acres)	Alignment crosses: • 62 agricultural parcels (213 acres) • 0 residential parcels • 0 commercial parcels • 0 industrial parcels
	Properties with access affected	Access to property along west side of right-of-way affected. Road network reconfiguration required to restore access. Not all access could be restored.	Minor access issues due to viaduct pier placement. All or most can be mitigated.	Minor access disruption to farmland; all can be mitigated.
	Local traffic effects around stations	Requires relocation of existing Amtrak station. No major traffic impact likely.	No impact.	No impact.
	Local traffic effects at grade separations	New grade separations required. Major impact on local traffic.	Minor impact on local traffic.	No impact.
Design Objectives	**Travel time**	Same.		4.5 seconds less than through town.
	Route length	Same.		1,448 feet shorter than through town.
	Intermodal connections	Not applicable.		
	Capital costs	High cost. Requires relocation of several BNSF sidings and industrial spurs, relocation of Amtrak station, 2–3 grade separations.	High cost. Elevated viaduct through town adjacent to active railway.	Lowest cost. Mostly at-grade construction through farmland and open space.
	Operating costs	Similar to bypass option.	Slightly higher costs due to climb and descend movement.	Similar to through town option.
	Maintenance costs	Slightly higher than bypass option.	Highest cost due to length of viaduct.	Lowest of three options.
Land Use	**Potential for Transit Oriented Development**	Not applicable.		
	Consistency with other planning efforts	Not consistent with town redevelopment plans. Poses barrier to cross-town travel.	Lowest impact on sensitive land uses.	Alignment runs through designated agricultural land. No conflict with current plans.
Constructability	**Constructability**	▪ Requires remodeling and/or relocating of sidings in Corcoran and relocation of Amtrak station. ▪ Construction access restricted by properties and the BNSF.	▪ Involve the complex construction of long length of viaduct adjacent to an operational railway. ▪ Access to the construction right-of-way restricted by properties and the BNSF.	▪ Construction access readily achieved from the adjacent highway.
	Disruption to existing railroads	▪ Impact on existing rail operations (both passenger and freight). ▪ Restriction on some operations likely during construction. ▪ Requires relocation of Amtrak Station. ▪ Could sever up to 6 industrial sidings.	▪ Limited impact on existing railroad operations.	▪ No impact on existing railroad operations.
	Disruption to and relocation of utilities	▪ Greatest impact due to at-grade construction through developed area with railroad mainline, spurs, local streets, state highway, and associated infrastructure.	▪ Limited impact.	▪ Lowest impact.

Table 4-8. Summary Comparison of Corcoran Options

Category	Measurement	Through Town, At-Grade, West Side of BNSF (CTT1A)	Through Town Elevated, East Side of BNSF (CTT1B)	Bypass East of Town, At-Grade (CTT1C)
Environmental Resources	**Waterways/Sensitive Habitat Areas**	Crosses 2 waterways (82–115 feet wide): • Cross Creek • Tule River		
		Crosses 44 acres of wetland habitat north of Corcoran, consisting of: • 28 acres of vernal pool complex areas • 16 acres of irrigation ponds	Crosses 41 acres of wetland habitat north of Corcoran, consisting of: • 26 acres of vernal pool complex areas • 15 acres of irrigation ponds	Crosses 35 acres of wetland habitat, generally north of Corcoran, consisting of: • 20 acres of vernal pool complex areas • 15 acres of irrigation ponds and freshwater emergent ponds/wetlands
		Crosses no designated critical habitat.		
		Impacts 24 acres and 2 threatened and endangered species: • San Joaquin Kit Fox in the Corcoran area • Swainson's Hawk south of Corcoran and near Pixley	Impacts 26 acres and two threatened and endangered species: • San Joaquin Kit Fox in the Corcoran area • Swainson's Hawk south of Corcoran and near Pixley	Impacts 29 acres and two threatened and endangered species: • San Joaquin Kit Fox in the Corcoran area • Swainson's Hawk south of Corcoran and near Pixley
	Cultural Resources	No impacts to National Register of Historic Places-listed properties. One historic property in CHRIS database, south of Avenue 136.		
	Parklands	No parks within a quarter-mile.	No parks within alignment. 1 park within a quarter-mile of alignment.	No parks within a quarter-mile.
	Agricultural lands	Traverses 108 acres of important farmland, 4 acres classified as prime.	Traverses 117 acres of important farmland, 4 acres classified as prime.	Traverses 171 acres of important farmland, 4 acres classified as prime.
	Noise and vibration	262 sensitive noise receptors: • 259 residential parcels • 1 library • 1 city hall • 1 church Vibration impacts: 18 residential parcels within 275 feet	239 sensitive noise receptors: • 236 residential parcels • 1 library • 1 city hall • 1 church Vibration impacts: 13 residential parcels within 275 feet	No sensitive noise or vibration receptors.
	Visual/scenic resources	Medium visual impact. Street-level views are degraded.	Greatest visual impact. 26 residential parcels within quarter-mile of elevated structure.	Least substantial visual impact. No residential parcels within a quarter-mile of elevated structures.
	Geotechnical constraints	No fault crossings or areas of documented high landslide susceptibility.		
		14 acres of highly erodible soils (K Factor > 0.4) located north of Corcoran.	7 acres of highly erodible soils (K Factor > 0.4) located north of Corcoran.	16 acres of highly erodible soils (K Factor > 0.4) located north of Corcoran.
	Hazardous materials	None.	None.	None.

Note: Dark gray shading in the table Header indicates which alternatives were not recommended to be carried forward to the environmental review. Light gray shading in the table body indicates the reason for that recommendation.

CHRIS = California Historical Resources Information System

Table 4-9. Summary Comparison of Wasco and Shafter Options

Category	Measure	Through Wasco & Shafter At Grade (CTT2A)	Through Wasco & Shafter Elevated (CTT2B)	Wasco Bypass Through Shafter At Grade (CTT2C)	Wasco & Shafter Bypass (CTT2D)	Through Wasco Elevated / Through Shafter At Grade (CTT2E)	Through Wasco At Grade /Through Shafter Elevated (CTT2F)	Wasco/Shafter/7th Standard Road East Bypass (CTT2G)
Disruption to Communities	**Displacements**	Crosses: ▪ 69 agricultural parcels (242 acres) ▪ 4 residential parcels (3 acres) ▪ No commercial parcels ▪ 40 industrial parcels (28 acres)	Crosses: ▪ 85 agricultural parcels (229 acres) ▪ No residential parcels ▪ No commercial parcels ▪ 46 industrial parcels (27 acres)	Crosses: ▪ 71 agricultural parcels (258 acres) ▪ No residential parcels ▪ No commercial parcels ▪ 27 industrial parcels (22 acres)	Crosses: ▪ 66 agricultural parcels (278 acres) ▪ No residential parcels ▪ No commercial parcels ▪ 2 industrial parcels (2 acres)	Same as CTT2B.	Same as CTT2A.	Crosses: ▪ 48 agricultural parcels (252 acres) ▪ No residential parcels ▪ No commercial parcels ▪ 1 industrial parcel (3 acres)
	Properties with access affected	Impacts access to properties east of tracks in Wasco and Shafter.	Negligible impact on existing properties, assuming HST located above the BNSF right-of-way.	Impacts properties through Shafter (assuming it is at grade) and a small number of properties around the north side of Wasco.	Impacts limited to farmland. A few farm buildings directly on the alignment may require demolition.	Impacts access to properties on east side of tracks in Shafter.	Impacts access to properties on east side of tracks in Wasco.	Same as CTT2D.
	Local traffic effects around stations	Not applicable.						
	Local traffic effects at grade separations	Impacts local traffic movement in the towns.	Some impact on existing local traffic movements.	A compromise between the through-town and bypass alternatives.	Negligible impact on existing local traffic movements.	Impact local traffic movement in Shafter.	Impact on local traffic movement in Wasco.	Negligible impact on existing local traffic movements.
	Travel time	(Baseline)	Similar to CTT2A	Saves 2 seconds over CTT2A	Saves 6 seconds over CTT2A.	Similar to CTT2A	Similar to CTT2A	Saves 7 seconds over CTT2A.
Design Objectives	**Route length**	(Baseline)	Similar to CTT2A	0.1 miles shorter than CTT2A, B, E and F.	0.4 miles shorter than CTT2A, B, E and F.	Similar to CTT2A	Similar to CTT2A	0.5 miles shorter than CTT2A, B, E and F.
	Intermodal connections	Not applicable.						
	Capital costs	More expensive due to disruption to existing railroad and highway operations.	More expensive due to extent of viaduct.	Less expensive than through-town alignments because it avoids impacts to railroad operations in Wasco.	Less expensive, because it avoids impacts to existing sidings in Wasco and south of Shafter, and to properties in towns.	More expensive than bypass alternatives because of viaduct in Wasco and disruption and modifications to road and rail operations in Shafter.	More expensive than bypass alternatives because of viaduct in Shafter and disruption and modifications to road and rail operations in Wasco.	Least expensive it is almost entirely at-grade through greenfield areas.
	Operating costs	Similar to bypasses.	Possibly higher due to security monitoring.	Similar to CTT2B.	Least expensive due to primarily at-grade construction in non-urban area.	Similar to CTT2B.	Similar to CTT2B.	Similar to CTT2D.
	Maintenance costs	High maintenance cost due to restricted spacing through Wasco and Shafter affording little access for maintenance.	▪ Highest maintenance cost due to length of viaduct. ▪ Proximity of BNSF operations next to viaduct could restrict inspection and maintenance activities.	Lower maintenance cost.	Low maintenance cost.	High maintenance cost compared with bypasses, due to length of viaducts and reduced maintenance access.	Similar to CTT2E.	Lowest maintenance cost due to all at-grade profile and slightly shorter length.
Land Use	**Potential for Transit Oriented Development**	Not applicable.						

Table 4-9. Summary Comparison of Wasco and Shafter Options

Category	Measure	Through Wasco & Shafter At Grade (CTT2A)	Through Wasco & Shafter Elevated (CTT2B)	Wasco Bypass Through Shafter At Grade (CTT2C)	Wasco & Shafter Bypass (CTT2D)	Through Wasco Elevated / Through Shafter At Grade (CTT2E)	Through Wasco At Grade /Through Shafter Elevated (CTT2F)	Wasco/Shafter/7th Standard Road East Bypass (CTT2G)
	Consistency with other planning efforts	▪ Traverses mainly agriculture areas except in Wasco and Shafter. ▪ South of Shafter, would impact planned BNSF yard development.	▪ Traverses mainly agriculture areas, except within Wasco and Shafter. ▪ Elevated alignments on sensitive land uses. ▪ South of Shafter, alignment impacts planned BNSF yard development.	▪ Traverses mainly agriculture areas, except within Wasco and Shafter. ▪ Reduces the length of track through urbanized Wasco. ▪ Impacts planned Rose City Industrial park at Wasco. ▪ South of Shafter, impacts planned BNSF yard development.	▪ Traverses mainly agriculture areas. ▪ Reduces the length of track through urbanized areas. ▪ Impacts planned Rose City Industrial park at Wasco.	▪ Traverses mainly agriculture areas, except within Wasco and Shafter. ▪ May have fewer impacts on sensitive land uses than an at-grade alternative. ▪ South of Shafter, impacts planned BNSF yard development.	▪ Traverses mainly agriculture areas, except within Wasco and Shafter. ▪ South of Shafter, impacts planned BNSF yard development.	Bisects approved mixed-use development south of 7th Standard Road (Rosedale Ranch).
Constructability	**Constructa-bility**	▪ Involves reconfiguring sidings, highways, property demolition, and utility works. Construction relatively straightforward. ▪ Construction access difficult through centers of Wasco and Shafter.	▪ Requires construction of long viaducts through the middle of towns, adjacent to and above operational lines and sidings. ▪ Construction access difficult through centers of Wasco and Shafter.	▪ Simpler to construct in Wasco, but retains the amount of pre-construction work through Shafter. ▪ Construction access good in Wasco but poorer in Shafter.	▪ Simplest to construct. ▪ Construction access would be straightforward.	▪ Requires construction of a viaduct through the middle of Wasco, and disruption to BNSF and the local road network Shafter. ▪ Construction access difficult through centers of Wasco and Shafter.	▪ Requires construction of a viaduct through the middle of Shafter, and disruption to BNSF and the local road network Wasco. ▪ Construction access difficult through centers of Wasco and Shafter.	Same as CTT2D.
	Disruption to existing railroads	▪ Impacts existing railroad operations. Closures of some BNSF operations required during construction. ▪ Severs approximately 24 sidings through Wasco and Shafter.	▪ Impacts existing railroad operations. Closures of some BNSF operations required during construction. ▪ Severs approximately 17 sidings south of Shafter (unless HST alignment is elevated for approximately 6 miles beyond the southern limits of Shafter). ▪ Impact on sidings in Wasco depends on design development; however remodeling of sidings probably required.	▪ Few impacts on railroad operations ▪ Closures of some BNSF operations required during construction. ▪ Avoids impacts in Wasco, but not south of Shafter. Severs about 17 sidings.	▪ Almost no impact on existing railroad operations. ▪ Severs 3 sidings at Crome.	▪ Impacts existing railroad operations. Requires reconfiguration of BNSF track in Wasco and severs several sidings in Shafter. Closures of some BNSF operations likely required during construction.	▪ Impacts existing railroad operations. Requires reconfiguration of BNSF track in Shafter, and severs several sidings in Wasco. Closures of some BNSF operations likely required during construction.	No disruption to existing railroad operations.
	Disruption to and relocation of utilities	Crosses: ▪ 75 water lines ▪ 15 storm drains ▪ 2 sewer lines ▪ 4 natural gas lines ▪ 2 electric transmission lines, and ▪ 4 crude oil lines	Crosses: ▪ 4 sewer lines ▪ 7 storm drains ▪ 10 water lines ▪ 2 electric transmission lines ▪ 4 natural gas lines and ▪ 4 crude oil pipelines	Crosses: ▪ 2 electric transmission lines ▪ 4 natural gas lines ▪ 1 water line and ▪ 4 crude oil pipelines	Crosses: ▪ 2 electric transmission lines ▪ 4 natural gas lines and ▪ 4 crude oil pipelines	Same as CTT2B.	Same as CTT2A.	Crosses: ▪ 2 electric transmission lines ▪ 4 natural gas lines and ▪ 4 crude oil pipelines

Table 4-9. Summary Comparison of Wasco and Shafter Options

Category	Measure	Through Wasco & Shafter At Grade (CTT2A)	Through Wasco & Shafter Elevated (CTT2B)	Wasco Bypass Through Shafter At Grade (CTT2C)	Wasco & Shafter Bypass (CTT2D)	Through Wasco Elevated / Through Shafter At Grade (CTT2E)	Through Wasco At Grade /Through Shafter Elevated (CTT2F)	Wasco/Shafter/7th Standard Road East Bypass (CTT2G)
Environmental Resources	**Waterways/ Sensitive Habitat Areas**	Crosses Poso Creek north of Wasco (60 feet wide).				Same as CTT2B.	Same as CTT2A.	
		Crosses 5 acres of wetland habitat scattered along the alignment: ▪ freshwater emergent wetlands and ▪ freshwater ponds	Crosses 2 acres of wetland habitat scattered along the alignment ▪ freshwater emergent wetlands and ▪ freshwater ponds.	Crosses 4 acres of wetland habitat scattered along the alignment ▪ freshwater emergent wetlands, ▪ freshwater ponds, and ▪ irrigation basins	Crosses 3 acres of wetland habitat scattered along the alignment ▪ freshwater emergent wetlands, ▪ freshwater ponds, and ▪ irrigation basins			Crosses 2 acres of wetland habitat in southern end of alignment: ▪ riverine, ▪ freshwater ponds, and irrigation basins
		Does not cross any designated critical habitat.						
		Impacts 64 acres and 3 threatened and endangered species: ▪ Blunt-nosed leopard lizard ▪ California jewel-flower ▪ San Joaquin woollythreads	Impacts 51 acres and 3 threatened and endangered species: ▪ Blunt-nosed leopard lizard ▪ California jewel-flower ▪ San Joaquin woollythreads	Impacts 48 acres and 2 threatened and endangered species: ▪ California jewel-flower ▪ San Joaquin woollythreads	Impacts 47 acres and 2 threatened and endangered species: • California jewel-flower north of Wasco • San Joaquin woollythreads around Shafter.			Impacts 23 acres and 1 threatened and endangered species: • California jewel-flower north of Wasco
	Cultural Resources	No impacts to National Register of Historic Places-listed properties. One historic property reported in the CHRIS database.						
	Parklands	No parks within the alignment.	No parks within the alignment.	No parks within the alignment	No parks within the alignment.	Same as CTT2B.	Same as CTT2A.	No parks within the alignment.
		2 parks within a quarter-mile, in Rosedale and Shafter.	2 parks within a quarter-mile, in Rosedale and Shafter.	2 parks within a quarter-mile, in Rosedale and Shafter.	1 park within a quarter-mile, in Shafter.			1 parks within a quarter-mile, in Bakersfield.
	Agricultural lands	Traverses 234 acres of important farmland, 229 acres classified as prime.	Traverses 223 acres of important farmland, 218 acres classified as prime.	Traverses 252 acres of important farmland, 248 acres classified as prime.	Traverses 282 acres of important farmland, 278 acres classified as prime.	Same as CTT2B.	Same as CTT2A.	Traverses 263 acres of important farmland, 258 acres classified as prime
	Noise and vibration	455 sensitive noise receptors in the vicinity of the alignment: • 442 residential parcels • 9 churches • 1 library • 1 city hall • 1 historic site, and • 1 school 11 sensitive vibration receptors within 275 feet of the alignment: • 9 residential parcels and • 2 churches	569 sensitive noise receptors in the vicinity: • 552 residential parcels • 12 churches • 1 library • 1 city hall • 1 historic site, and • 2 schools 13 sensitive vibration receptors within 275 feet of the alignment: • 11 residential parcels and • 2 churches	207 sensitive noise receptors in the vicinity: • 197 residential parcels • 8 churches • 1 library • 1 city hall • 1 historic site 7 sensitive vibration receptors within 275 feet of the alignment: • 5 residential parcels, and • 2 churches	199 sensitive noise receptors in the vicinity of the alignment: • 198 residential parcels and • 1 historic site 5 sensitive vibration receptors within 275 feet of the alignment in Shafter: • 5 residential parcels.	Same as CTT2B.	Same as CTT2A.	145 sensitive noise receptors in the vicinity of the alignment: 1 sensitive vibration receptor within 275 feet of the alignment in Bakersfield
	Visual/scenic resources	▪ Expands existing railroad and increases visual impact. ▪ No residential parcels are within a quarter-mile of elevated structures.	▪ Has the most substantial visual impact. ▪ 655 residential parcels within quarter-mile of elevated structures.	▪ CTT2C and D have the least substantial visual impacts. ▪ No residential parcels within a quarter-mile of elevated structures.	▪ CTT2C and D have the least substantial visual impact. ▪ No residential parcels within a quarter-mile of elevated structures.	▪ The viaduct through Wasco would create a visual impact	▪ The viaduct through Shafter would create a visual impact.	Same as CTT2D.
	Geotechnical constraints	One concealed quaternary fault crosses the alignment just west of McFarland. No areas of documented high landslide susceptibility.						
		5 acres of highly erodible soils (K Factor > 0.4) located north of Wasco.	5 acres of highly erodible soils (K Factor > 0.4) located north of Wasco.	3 acres of highly erodible soils (K Factor > 0.4) located north of Wasco.	Same as CTT2C	Same as CTT2B.	Same as CTT2A.	Same as CTT2D.
	Hazardous materials	1 hazardous materials site	2 hazardous materials sites	1 hazardous materials site	No hazardous materials sites	Same as CTT2B.	Same as CTT2A.	Same as CTT2D.

Note: Dark gray shading in the e table Header indicates which alternatives were not recommended to be carried forward to the environmental review. Gray shading in the table body indicates the reason for that recommendation.

Table 4-10. Summary Comparison of Fowler, Selma, and Kingsburg Bypass Options[1]

Category	Measurement	Outer Bypass (CBPA)	Near Town Bypass (CBPB)
Disruption to Communities	**Displacements**	Crosses: • 136 agricultural parcels (250 acres) • 2 residential parcels (<1 acre) • No commercial parcels • No industrial parcels	Crosses: • 147 agricultural parcels (236 acres) • 27 residential parcels (2 acres) • No commercial parcels • No industrial parcels
	Properties with access affected	Similar.	
	Local traffic effects around stations	Not applicable.	
	Local traffic effects at grade separations	Similar.	Similar.
Design Objectives	**Travel time**	Base Option	Saves 9 seconds over Base Option.
	Route length	Base Option	0.6 miles shorter than the Base Option.
	Intermodal connections	Not applicable	
	Capital costs	More expensive than CBPB	Less expensive than CBPA, on a pro rata basis.
	Operating costs	Slightly higher	Slightly lower
	Maintenance costs	Slightly higher	Slightly lower
Land Use	**Potential for Transit Oriented Development**	Not applicable.	
	Consistency with other planning efforts	In Fresno County, passes through agricultural land. In Tulare County, passes through largely agricultural areas. Also crosses the Kings River, a sensitive conservation area.	
Constructability	**Constructability**	Similar	
	Disruption to existing railroads	No impact	
	Disruption to and relocation of utilities	Crosses: • 7 electric transmission lines and • 2 natural gas lines.	Crosses • 7 electric transmission lines • 2 natural gas lines and • 1 planned gas line
Environmental Resources	**Waterways/ Sensitive Habitat Areas**	Crosses 2 waterways south of Kingsburg (150–235 feet wide), including the Kings River. Crosses 3 acres of wetland habitat. Crosses 10 acres of designated critical habitat for: • California tiger salamander • Vernal pool fairy shrimp • Tadpole shrimp. Impacts 24 acres and one threatened or endangered species (California tiger salamander)	Crosses Kings River south of Kingsburg (130 feet wide). Crosses 5 acres of wetland habitat. Crosses 10 acres of designated critical habitat for: • California tiger salamander • Vernal pool fairy shrimp • Tadpole shrimp Impacts 16 acres and one threatened or endangered species (California tiger salamander).

Table 4-10. Summary Comparison of Fowler, Selma, and Kingsburg Bypass Options[1]

Category	Measurement	Outer Bypass (CBPA)	Near Town Bypass (CBPB)
	Cultural Resources	No impact	
	Parklands	No parks within the alignment No parks within a quarter-mile of the alignment.	No parks within the alignment. 1 park within a quarter-mile of the alignment
	Agricultural lands	Traverses 247 acres of important farmland, 153 acres classified as prime.	Traverses 242 acres of important farmland, 144 acres classified as prime.
	Noise and vibration	21 sensitive noise receptors in the vicinity of the alignment: • 20 residential parcels, and • 1 school 1 sensitive vibration receptor within 275 feet of the alignment: • 1 residential parcel	4 sensitive noise receptors within the vicinity of the alignment: • 4 residential parcels 4 sensitive vibration receptors within 275 feet of the alignment: • 4 residential parcels
	Visual/scenic resources	Slightly less visual impact. Mo residential parcels within a quarter-mile of elevated structures.	Slightly higher visual impact. Mo residential parcels within a quarter-mile of elevated structures.
	Geotechnical constraints	No fault crossings or areas of documented high landslide susceptibility within the alignment.	
		31 acres of highly erodible soils (K Factor > 0.4) within the alignment corridor.	27 acres of highly erodible soils (K Factor > 0.4) within the alignment corridor.
	Hazardous materials	No hazardous materials sites	1 hazardous materials site

[1] Options withdrawn from consideration because of recommendations to not carry Alternatives C4, C5, C6 (UPRR route) forward.

Table 4-11. Summary Comparison of Visalia Station Alignment Options

Category	Measure	SR-198 East (CVSA)	SR-99 Center (CVSB)	SR-99 North (CVSC)
Disruption to Communities	**Displacements**	Crosses: • 109 agricultural parcels (302 acres) • 1 residential parcel (0.1 acre) • No commercial parcels • No industrial parcels	Crosses: • 104 agricultural parcels (310 acres) • No residential parcels • No commercial parcels • No industrial parcels	Crosses: • 104 agricultural parcels (291 acres) • 6 residential parcels (0.4 acre) • No commercial parcels • 12 industrial parcels (12 acres)
	Properties with access affected	Impact agricultural and a small number of properties located beyond the Goshen town limits.	Similar to CVSA	Impacts properties adjacent to UPRR through Goshen.
	Local traffic effects around stations	Little impact	Little impact	Minor impact on traffic in Goshen
	Local traffic effects at grade separations	Similar	Similar	Similar
Design Objectives	**Travel time**	Base Option	Adds 6 seconds over the Base Option.	Adds 18 seconds over the Base Option.
	Route length	Base Option	0.3 mile longer than Base Option.	1.1 mile longer than Base Option.
	Intermodal connections	Not applicable.		
	Capital costs	Less expensive than CVSC	Less expensive than CVSC	Most expensive.
	Operating costs	Very similar to CVSB.	Very similar to CVSA, but slightly higher due to longer alignment	Higher operating costs due to viaduct
	Maintenance costs	Very similar to CVSB	Very similar to CVSA, but slightly due to longer alignment.	Highest maintenance costs due to extended viaduct and elevated station.
Land Use	**Potential for Transit Oriented Development**	In unincorporated Tulare County on land designated as Valley Agriculture, which would not accommodate TOD. Area falls beyond the City of Visalia's Urban Area Boundary, which also suggests limited opportunity for TOD.	City of Visalia's current zoning designation for this area is quasi-public in the northwest section and agricultural for the remaining areas. Existing land use includes the City of Visalia's water treatment plant and agricultural uses. TOD opportunities appear limited based on existing and planned uses.	In unincorporated Tulare County, in an area designated for a mix of industrial and commercial uses, according to Tulare County's Goshen Community Plan. Area appears to be constrained for TOD by the junction of the railroad tracks, as well as pattern of existing uses to the northwest and south.
	Consistency with other planning efforts	See discussion of potential for TOD above.		

Table 4-11. Summary Comparison of Visalia Station Alignment Options

Category	Measure	SR-198 East (CVSA)	SR-99 Center (CVSB)	SR-99 North (CVSC)
Constructability	**Constructability**	Similar to CVSB. Construction access easy, using the permanent access road and HST right-of-way.	Similar to CVSA.	Involves construction over highway, railroad, and properties in Goshen and adjacent to the UPRR. Difficult construction access.
	Disruption to existing railroads	Negligible impact on existing railroad operations. No impact on existing railroad sidings.	Same as CVSB	Impacts SJVR and UPRR during construction, particularly around Goshen Junction. No impact on railroad sidings, though some sidings may need to be removed or remodeled.
	Disruption to and relocation of utilities	Crosses: • 3 electric transmission lines • 1 natural gas line and • 1 planned gas line	Crosses: • 3 electric transmission lines • 1 natural gas line and • 1 planned gas line	Crosses: • 3 electric transmission lines • 1 natural gas line • 1 planned gas line, and • 10 sewer lines
Environmental Resources	**Waterways/ Sensitive Habitat Areas**	Crosses 4 creeks 45–235 feet wide. Crosses 10 acres of wetland habitat: • 7 acres of vernal pool complex • 3 acres riverine habitat Crosses 25 acres of designated critical habitat for: • vernal pool fairy shrimp • tadpole shrimp and • California tiger salamander. Impacts 17 acres and 1 threatened or endangered species (tiger salamander)		
	Cultural Resources	No impacts		
	Parklands	No parks within a quarter-mile		
	Agricultural lands	Traverses 299 acres of important farmland, 179 acres classified as prime.	Traverses 302 acres of important farmland, 187 acres classified as prime.	Traverses 291 acres of important farmland, 180 acres classified as prime.
	Noise and vibration	2 sensitive noise receptors: • 1 residential parcel One sensitive vibration receptor within 275 feet of the alignment: • 1 residential parcel	3 sensitive noise receptors: • 2 residential parcels and • 1 school No sensitive vibration receptors within 275 feet of the alignment	2 sensitive noise receptors: • 2 schools No sensitive vibration receptors within 275 feet of the alignment.
	Visual/scenic resources	Less visual impact. 6 residential parcels located within a quarter-mile of elevated structures.	Less visual impact. 36 residential parcels located within a quarter-mile of elevated structures.	Higher visual impact than CVSA and CVSB. 517 residential parcels located within a quarter-mile of elevated structures.
	Geotechnical constraints	No fault crossings or areas of high landslide susceptibility within alignment. 33 acres of highly erodible soils (K Factor > 0.4) located within alignment corridor.		
	Hazardous materials	No hazardous materials sites		1 hazardous materials waste.

Note: Dark gray shading in the table Header indicates which alternatives were not recommended to be carried forward to the environmental review. Gray shading in the table body indicates the reason for that recommendation.

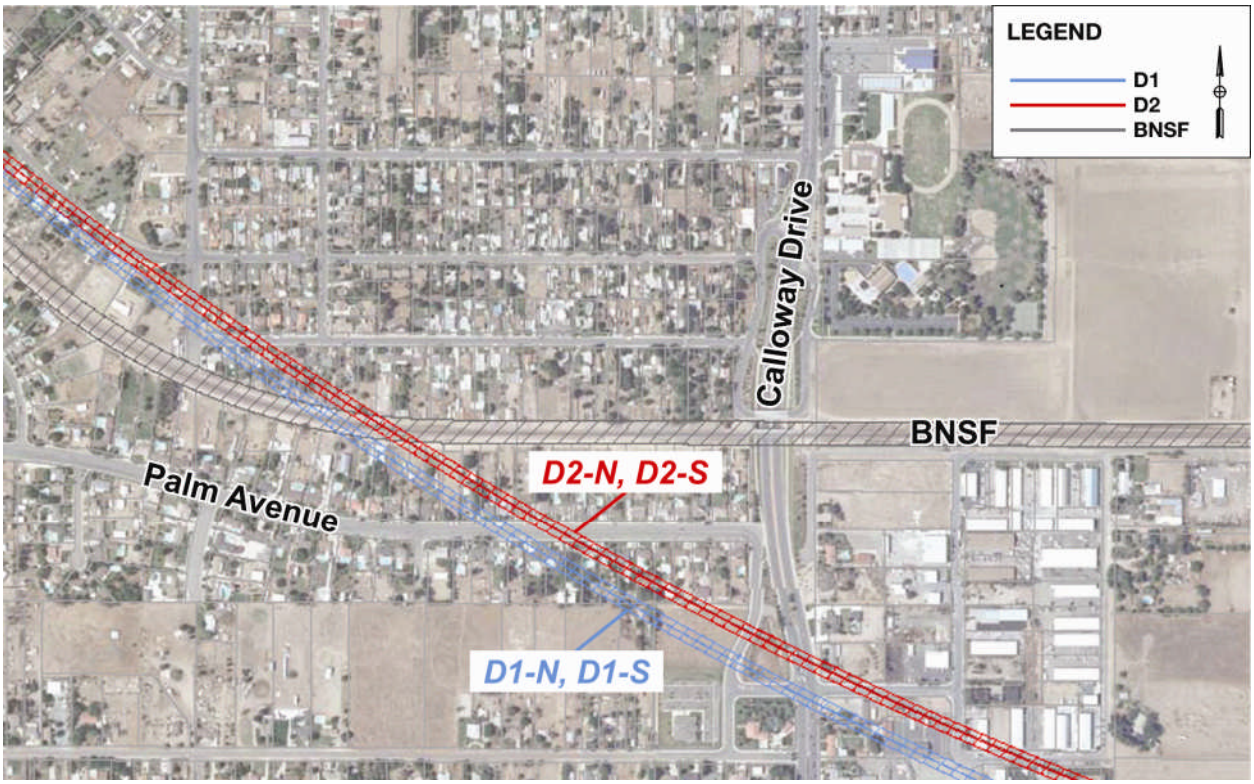
4.3. Bakersfield Subsection

The Bakersfield Subsection begins at Hageman Road in Rosedale, northwest of Bakersfield, where it meets the Rural Subsection. It continues through downtown Bakersfield and terminates at Oswell Street, southeast of downtown, where it meets the Bakersfield to Palmdale Section. The evaluation of alternatives for the Bakersfield to Palmdale Section are described in the forthcoming *Preliminary Alternatives Analysis Report for the Bakersfield to Palmdale Section.*

4.3.1. Alternatives Considered

Two alternatives (D1 and D2) were carried forward from the initial analysis of alternatives, each with two local options (see Figure 4-29). All alternatives are elevated throughout this Subsection.

Figure 4-29. West Bakersfield Alignments



Alternative D1 minimizes impacts on East Bakersfield by remaining in an industrial corridor; however, it also displaces a classroom building on the Bakersfield High School campus and requires construction through the BNSF Bakersfield Yard. Local options for D1 near the UPRR right-of-way east of Kern Junction have varying impacts along Edison Highway.

A second alternative, D2, eliminates eliminate the impact on Bakersfield High School, but is 500 feet farther from the Amtrak station and has greater impacts in East Bakersfield, an environmental justice (EJ) community. Local Option D2-N reduces the impacts to BNSF facilities while Option D2-S remains elevated above the existing BNSF mainline tracks for an extended distance.

The Bakersfield Subsection alternatives are shown in Table 4-13. A more detailed description of the Bakersfield alternatives is included in Section 3.3.3.

Table 4-13. Bakersfield Subsection – Alignment Alternatives Considered (All Elevated)

Alternative	Central Bakersfield	Distance to Amtrak Station	East Bakersfield
D1-N	Through BNSF Yard	Adjacent	North of UPRR
D1-S	Through BNSF Yard	Adjacent	South of UPRR
D2-N	North of BNSF Right-of-Way	One Block South	South of UPRR
D2-S	Over BNSF Main Line	One Block South	South of UPRR

4.3.2. Evaluation

The alternatives were assessed against the project objectives and evaluation criteria described in Section 2.0. The results of this Alternatives Analysis evaluation for the Bakersfield Subsection are detailed Table 4-14, starting on page 4-54. The impacts common to all alternatives/options are documented in Appendix F-3 – Impacts Common to All Alternatives – Bakersfield Subsection.

All of the Bakersfield alternatives were evaluated in light of their relationships to key local resources and issues.

- Rosedale displacements
- Westside Parkway design
- BNSF Yard
- Bakersfield High School
- Mill Creek Redevelopment
- East Bakersfield displacements
- UPRR Kern Junction Yard
- UPRR right-of-way/Edison Highway

To facilitate comparison of the alternatives under consideration, the Bakersfield Subsection has been divided into three geographic areas: West Bakersfield, including Rosedale and Westside Parkway; Central Bakersfield, including the BNSF Yard, Bakersfield High School and Downtown; and East Bakersfield. Following are summary evaluations of the alternatives relevant to these geographic areas, along with descriptions of options associated with the alternatives. These summary evaluations draw upon the detailed analysis presented in Table 4-14.

A. West Bakersfield

West Bakersfield – Rosedale

Both alignment alternatives (and their local options) traverse residential areas east and south of the BNSF mainline to Calloway Drive, encroaching on over 70 residential properties (see Figure 4-29). They pass through a proposed mixed-use development east of Calloway (Bakersfield Commons) that is currently under environmental review. The Authority is preparing a request to the City of Bakersfield for an easement through this property to accommodate construction and operation of the HST.

West Bakersfield – Westside Parkway

Both alternatives traverse and parallel the Westside Parkway south of the Flying J Refinery and across the Kern River. The pier placement for the HST structure would be designed to avoid directly affecting the Parkway and the recreational facilities along the Kern River.

B. Central Bakersfield

Central Bakersfield – BNSF Yard and Bakersfield High School

Alternatives D1-N and D1-S traverse the BNSF Yard and would displace the Industrial Arts Classroom Building at Bakersfield High School. The location of the alignments in this area is portrayed in Figure 4-30 and

Figure 4-31. BNSF is willing to allow relocation of yard track to accommodate HST elevated structures provided that operational safety can be preserved. Relocation of the Bakersfield High School Industrial Arts building is theoretically possible, but will require extensive and lengthy negotiations with the school district and the State Board of Education (see Appendix C).

Central Bakersfield – Downtown

The City of Bakersfield Economic and Community Development Department has identified a 200-foot setback south of the BNSF mainline near the existing Amtrak Station to accommodate an HST station and associated facilities (see Appendix C). Even with this setback, however, the station platform location for all alternatives could be constrained by the limited amount of area between the Amtrak station and the Mill Creek Redevelopment Area, which is being redeveloped to include a channelized water feature and residential and commercial uses west of S Street.

Figure 4-30. Alignments at Central Bakersfield BNSF Yard/Bakersfield High School

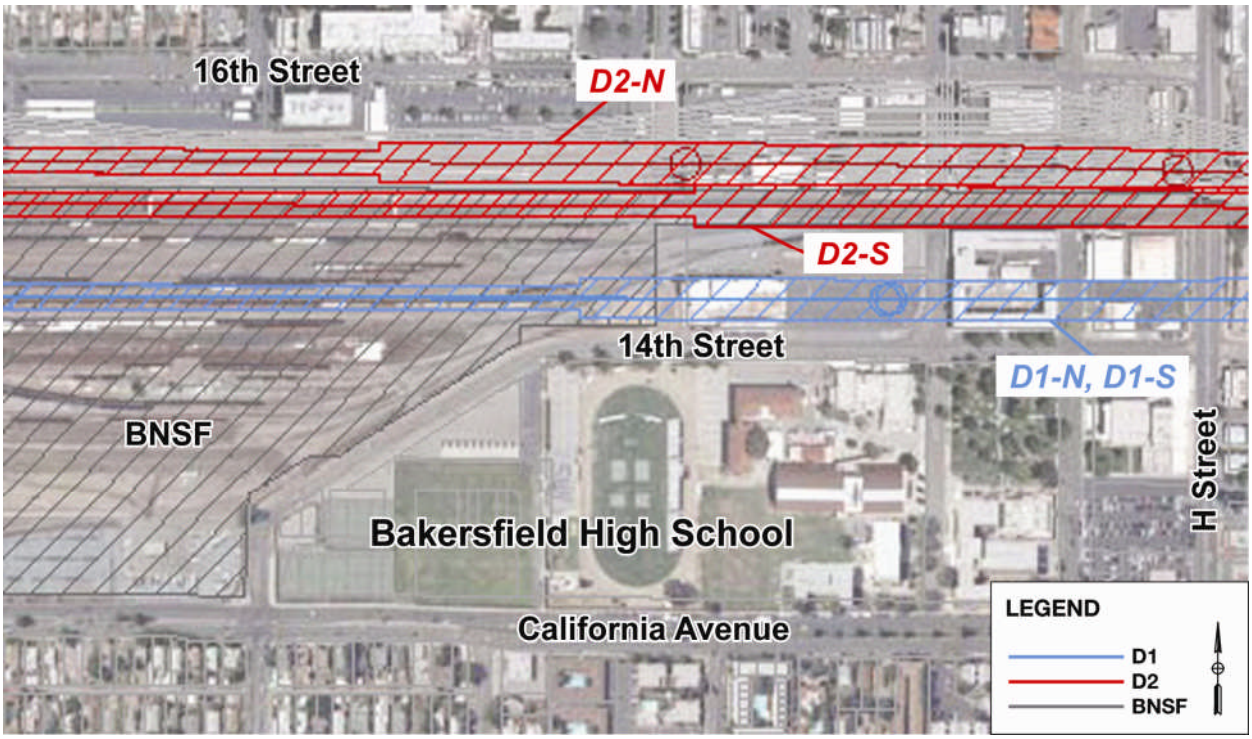
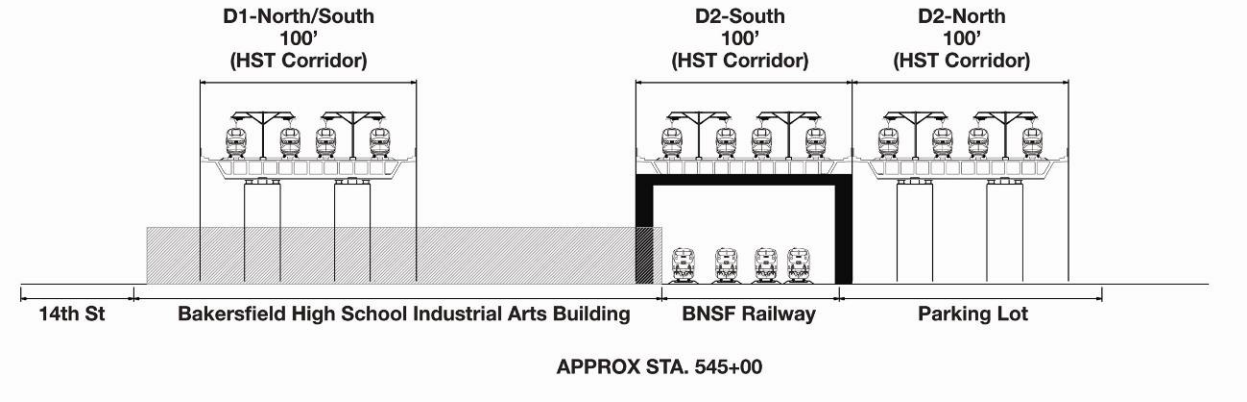


Figure 4-31. Bakersfield High School – Looking West

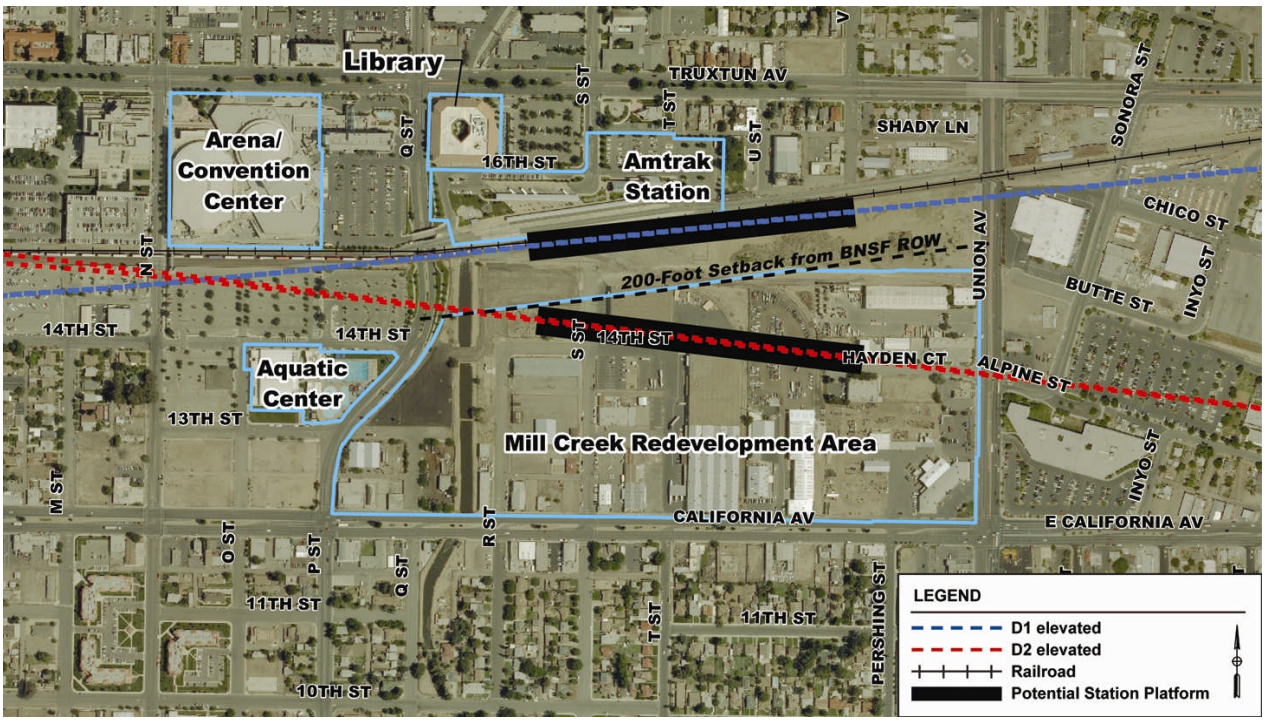


The station platform for Alternative D1-N and D1-S would be elevated over the BNSF mainline (Figure 4-32). Although this location would provide convenient access to the Amtrak intermodal facility on the north, it would also require careful coordination and cooperation of the BNSF and Amtrak.

Alternatives D2-N and D2-S both pass through the Mill Creek Redevelopment Area. By being elevated and outside the 200-foot setback, the station platform could avoid most construction conflicts with the BNSF and Amtrak, but it is farther away from the Amtrak station than Alternative D1-N and D1-S. Although the platform could be positioned to avoid currently planned redevelopment projects, integration with future redevelopment plans would need to be coordinated with the City.

Under both alignment alternatives, access to the station site and parking would also have to be coordinated through the City.

Figure 4-32. Bakersfield Station, Alignment, and Platform Locations



C. East Bakersfield

East of the station area, Alternatives D1-N and D1-S would parallel East Truxtun Avenue (Figure 4-33). Several businesses that border East Truxtun would be displaced.

Alternative D1-N would continue east to cross over the UPRR Kern Junction Yard on a skewed elevated structure (Figure 4-34). By remaining north of the UPRR, Alternative D1-N would pass through residential areas, displacing over 40 homes and an electrical substation.

Alternative D1-S would remain on the southern side of the UPRR right-of-way, paralleling Edison Highway on the west and coming to grade near Oswell Street. This alternative would displace more businesses than Alternative D1-N and would sever perpendicular access roads at Edison Highway, unless the highway is relocated west of the HST tracks.

East of the proposed HST station, Alternatives D2-N and D2-S are the same and would also become the same as Alternative D1-S starting at Oswell Street. Several houses, small businesses, and a church would be displaced by the D2 alternatives.

Figure 4-33. D1 Alignments along East Truxtun Avenue and D2 Alignments Along East California Avenue

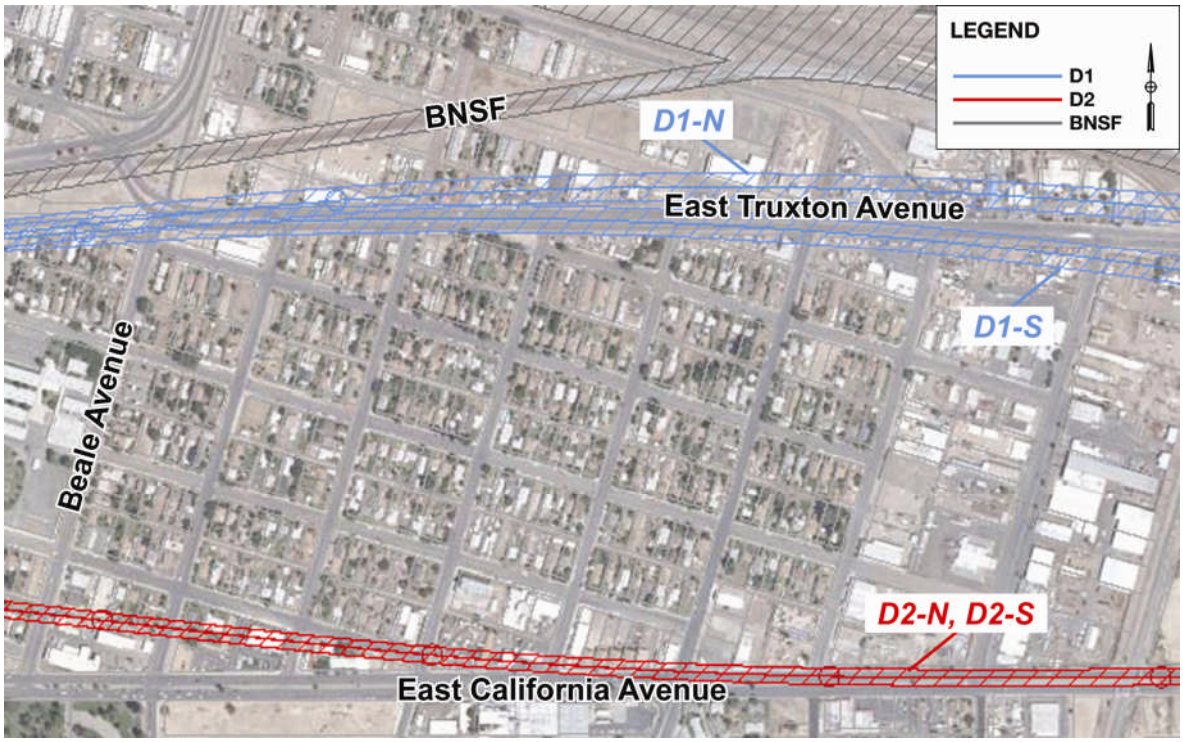
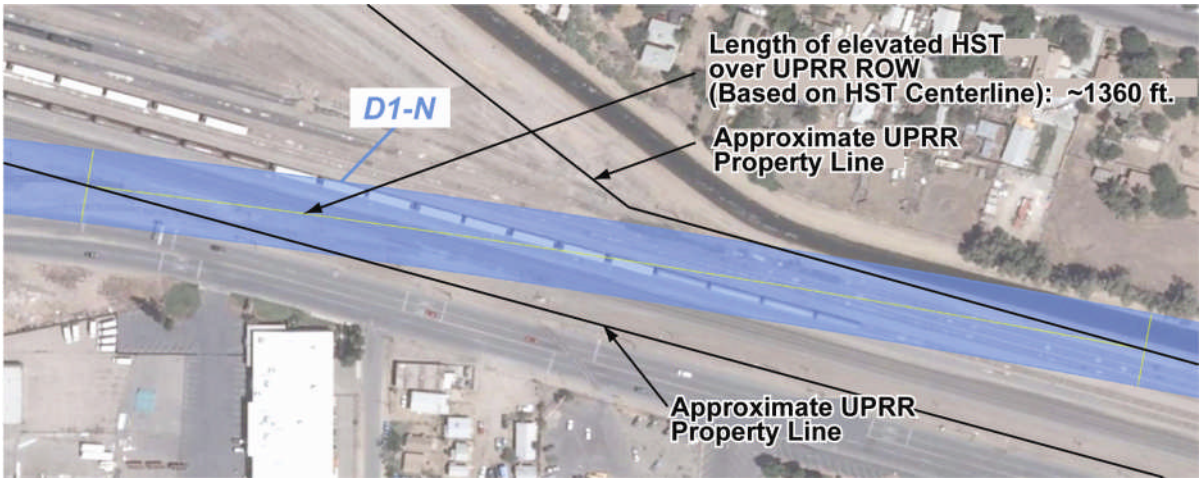


Figure 4-34. Flyover at UPRR Yard (Kern Junction)



4.3.3. Recommendations for Bakersfield Subsection

Table 4-15 summarizes the alternatives evaluated in the Alternatives Analysis. The Authority and FRA have recommended certain alternatives be further considered for analysis in the environmental document and for further engineering analysis. Figure 4-35 shows these alternatives. Detailed Plan and profile depictions of the alternatives/options to be carried forward are included in Appendix G-3.

Table 4-15. Alternatives Evaluation Analysis – Bakersfield Subsection

Alt.	Alignment	Findings	Recommendation
D1-N	Traverse BNSF yard, North of UPRR, elevated station adjacent to Amtrak station	▪ The alignment will displace school and commercial properties in central Bakersfield both north and south of BNSF. ▪ The alignment would displace a substantial number of residential uses in an environmental justice community. ▪ The alignment would potentially displace a major substation along a transmission corridor. ▪ The straddle-bent infrastructure needed to support a four-track elevated alignment over the BNSF mainline is very costly and complex. ▪ The additional costs and impacts associated with building elongated, skewed, elevated structures over the UPRR right-of-way at Kern Junction, are high.	▪ Not Carry Forward
D1-S	Traverse BNSF yard, South of UPRR, elevated station adjacent to Amtrak station	▪ Proximity of the alignment to BNSF mainline without possible disruption to mainline operation, except at the station area during construction. ▪ The opportunity to negotiate alignment and pier placement in the BNSF yard with the BNSF. ▪ The willingness of the school district to negotiate replacement of the Industrial Arts Building at Bakersfield High School. ▪ The proximity of the HST station to Amtrak within an area designated by the Redevelopment Agency. ▪ The limited effect on East Bakersfield residences. ▪ Avoidance of impacts on UPRR operations.	▪ Carry Forward

Table 4-15. Alternatives Evaluation Analysis – Bakersfield Subsection

Alt.	Alignment	Findings	Recommendation
D2-N	North of BNSF Yard and mainline, South of UPRR, elevated station south of Amtrak station	▪ Avoids impacting operations on BNSF mainline and in BNSF yard. ▪ Avoidance of Bakersfield High School facilities. ▪ Limited displacement of properties containing storage and commercial facilities north of the BNSF mainline. ▪ Opportunities for station integrated with Mill Creek redevelopment. ▪ Limited residential displacement and use of California Avenue into East Bakersfield. ▪ Avoidance of impacts on UPRR operations.	▪ Carry Forward
D2-S	Over BNSF Yard and mainline, South of UPRR, elevated station south of Amtrak station	▪ The alignment poses impacts to BNSF and Amtrak operations resulting from HST construction within extensive portions of the BNSF right-of-way. ▪ Extensive displacements of school facilities and commercial properties on both sides of the BNSF right-of-way in central Bakersfield would be required. ▪ The infrastructure needed to support a four-track elevated structure over the BNSF mainline and yard for nearly 3 miles is costly and complex.	▪ Not Carry Forward

Figure 4-35. Alternatives Retained – Bakersfield Subsection

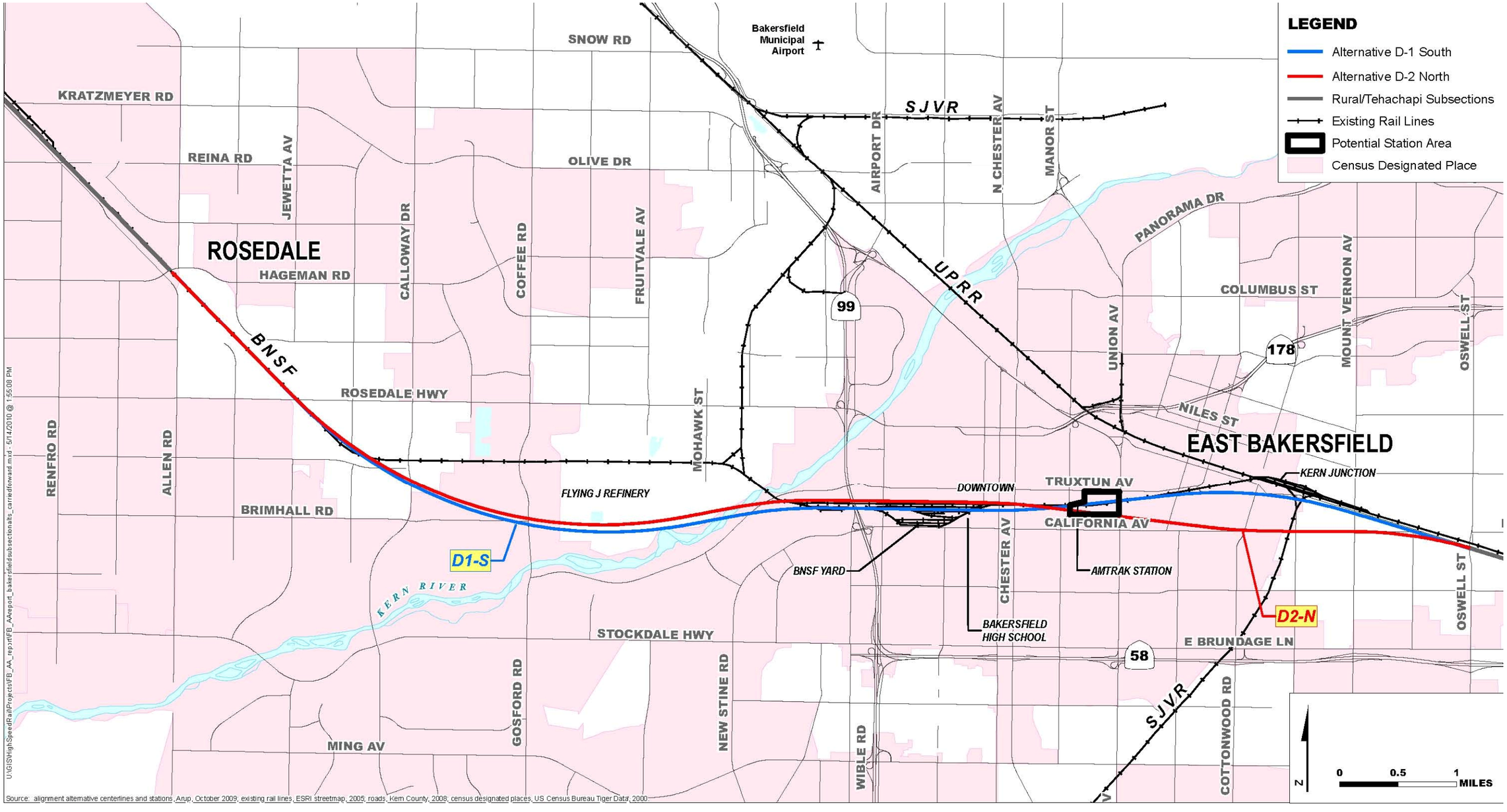


Table 4-14. Bakersfield Subsection – Summary Comparison of Alternatives

Category	Measure	Through BNSF Yard / Nearest to Amtrak Station (D1)		North of BNSF Yard / Further from Amtrak Station (D2)	
		North/East Side of UPRR Right-of-Way Below Kern Junction (D1-N)	South/West Side of UPRR Right-of-Way Below Kern Junction (D1-S)	North of BNSF Mainline Right-of-Way (D2-N)	Within BNSF Mainline Right-of-Way (D2-S)
Disruption to Communities	**Displacements**	Alignment crosses: • 16 agricultural parcels (22 acres) • 170 residential parcels (23 acres) • 36 commercial parcels (11 acres) • 25 industrial parcels (9 acres) Most residential displacements of Bakersfield alternatives. Requires replacement of Bakersfield High School industrial arts building.	Alignment crosses: • 16 agricultural parcels (24 acres) • 124 residential parcels (17 acres) • 88 commercial parcels (18 acres) • 55 industrial parcels (17 acres) Most commercial and industrial displacements of Bakersfield alternatives. Requires replacement of Bakersfield High School industrial arts building.	Alignment crosses: • 16 agricultural parcels (25 acres) • 153 residential parcels (19 acres) • 59 commercial parcels (12 acres) • 43 industrial parcels (13 acres) Displaces portion of City corporation yard and storage facilities.	Alignment crosses: • 16 agricultural parcels (25 acres) • 153 residential parcels (19 acres) • 56 commercial parcels (11 acres) • 39 industrial parcels (11 acres)
	Properties with access affected	At-grade alignment along Edison Highway could affect property access and land use. No other locations affected.			
	Local traffic effects around stations	Traffic circulation expected to remain at Level of Service C or better with HST station operation.			
	Local traffic effects at grade separations	No impact. Entire section is elevated.			
Design Objectives	**Travel time (220 mph)**	3 minutes 16 seconds			
	Route length	12.0 miles			
	Intermodal connections	Excellent. Elevated station platform immediately adjacent to Amtrak station platform. Amtrak station already serves intermodal connections.		Very good. Elevated station platform 450-700 feet south of Amtrak station platform. Amtrak station already serves intermodal connections.	
	Capital costs	▪ Very high cost, similar to D2-S. ▪ Completely elevated. ▪ Extensive reconstruction of BNSF yard. ▪ Two long, skewed spans crossing UPRR mainline and yard; could require piers on UPRR right-of-way at Kern Junction. ▪ Realignment of E. Truxtun Avenue required between Beale Avenue and Gage Street (1,000 ft).	▪ Less expensive than D1-N. ▪ Completely elevated. ▪ Extensive reconstruction of BNSF yard. ▪ Realignment of East Truxtun Avenue required between Beale Avenue and Gage Street (3,500 ft).	▪ Less expensive than D2-S. ▪ Completely elevated. ▪ Guideway crosses BNSF at a high skew angle east of Chester Avenue, requiring multiple straddle bents. ▪ Realignment of portions of East California Avenue required to accommodate piers.	▪ Very high cost, similar to D1-N ▪ Extensive straddle bent construction above the BNSF mainline operating tracks for approximately 2.3 miles. ▪ Straddle bent piers located on the adjacent properties as BNSF right-of-way may be too narrow.
	Operating costs	Similar for all alternatives.			
	Maintenance costs	Similar for all alternatives.			
Land Use	**Potential for Transit Oriented Development**	Similar for all alternatives. Stations located within designated redevelopment area. D1 alignments slightly closer to existing Amtrak station and commercial and cultural centers.			
	Consistency with other planning efforts	▪ Generally consistent with plans. ▪ Consistent with current redevelopment plans. ▪ Traverses City-supported Bakersfield Commons project area.		▪ Generally consistent with plans. ▪ Revision to current redevelopment plan possible. ▪ Traverses City-supported Bakersfield Commons project area.	
Constructability	**Constructability**	▪ Most complex construction of all alignments. ▪ Station and station track construction within BNSF right-of-way. ▪ Extensive construction within BNSF yard. ▪ Coordination with relocation/replacement of Bakersfield HS industrial arts building. ▪ Extensive construction within UPRR right-of-way below Kern Junction. ▪ Some realignment of Edison Road to maintain access from side streets.	▪ Similar to D1-N, except no construction within UPRR right-of-way.	▪ Fewest conflicts with railroad facilities and operations. ▪ Some conflicts with major Truxtun buildings possible. ▪ Maintenance of local access East California Avenue challenging. ▪ Some realignment of Edison Road possible to maintain access from side streets.	▪ Extensive, complex construction within BNSF mainline right-of-way. ▪ Straddle bent construction over BNSF tracks for 2.3 miles, with access limitations and need to maintain BNSF and Amtrak service. ▪ Maintenance of local access East California Avenue challenging. ▪ Some realignment of Edison Road possible to maintain access from side streets.
	Disruption to	▪ Extensive, complex staging required for construction	▪ Similar to D1-N, except no construction within UPRR	▪ Extensive coordination with BNSF required, but less than	▪ Extensive, complex staging required for construction within BNSF

Table 4-14. Bakersfield Subsection – Summary Comparison of Alternatives

Category	Measure	Through BNSF Yard / Nearest to Amtrak Station (D1)		North of BNSF Yard / Further from Amtrak Station (D2)	
		North/East Side of UPRR Right-of-Way Below Kern Junction (D1-N)	South/West Side of UPRR Right-of-Way Below Kern Junction (D1-S)	North of BNSF Mainline Right-of-Way (D2-N)	Within BNSF Mainline Right-of-Way (D2-S)
	existing railroads	within BNSF yard and across UPRR south of Kern Jct.	ROW.	D1 alternatives. ▪ No construction within UPRR right-of-way .	mainline across top of downtown yard. ▪ No construction within UPRR right-of-way.
	Disruption to and relocation of utilities	▪ All alignments require raising some transmission lines to clear HST elevated structures. ▪ Potentially displaces major substation Alignment crosses: • 37 sewer lines • 14 transmission lines • 7 crude oil pipelines • 8 natural gas pipelines	▪ All alignments require raising some transmission lines to clear HST elevated structures. ▪ Other utilities same as D1-N, except crosses one additional sewer line.	▪ All alignments require raising some transmission lines to clear HST elevated structures. ▪ Other utilities same as D1-N, except crosses 17 additional sewer lines.	▪ All alignments require raising some transmission lines to clear HST elevated structures. ▪ Other utilities same as D1-N, except crosses 20 additional sewer lines.
Environmental Resources	**Waterways/ Sensitive Habitat Areas**	Crosses 3 acres of wetland habitat: • 1.3 acres of riverine habitat (Kern River), and • 1.7 acres of freshwater/irrigation ponds Crosses 4 acres of habitat for 39 threatened and endangered species. No impact on natural areas or critical habitats.	Crosses 2 acres of wetland habitat: • 1.3 acres of riverine habitat (Kern River), and • 0.7 acres of freshwater/irrigation ponds Threatened and endangered habitat impact same as D1-N.	Crosses 1 acre of wetland habitat: • 0.9 acres of riverine habitat (Kern River), and • 0.1/industrial acres of freshwater/irrigation ponds Threatened and endangered habitat impact same as D1-N.	Crosses 1 acre of riverine habitat (Kern River). Threatened and endangered habitat impact same as D1-N.
	Cultural Resources	No impact on National Register of Historic Places-listed structures or California Historical Resources Information System sites.			
	Parklands	▪ 1 park (3 acres) directly affected. Crosses the Kern River Parkway between Cross Valley Canal and Truxtun Avenue. Also traverses a trail within park. ▪ 6 parks (11 acres) within a quarter-mile of alignment.	▪ Similar to D1-N, except 2 more acres of parkland within a quarter-mile.	▪ 1 park (0.3 acres) directly affected by HST. Crosses Kern River Parkway between Cross Valley Canal and Truxtun Avenue. Also traverses a trail within the park. ▪ 8 parks (36 acres) within a quarter-mile of the alignment.	▪ Similar to D2-N, except 2 fewer acres of parkland within quarter-mile.
	Agricultural lands	None within this subsection.			
	Noise and vibration	3,594 sensitive noise receptors within 700 feet: • 3,577 residential parcels • 2 libraries • 8 churches • 1 hospital • 6 schools 539 sensitive vibration receptors within 275 feet : • 537 residential parcels • 2 churches Noise and vibration may impact Bakersfield High School.	3,389 sensitive noise receptors within 700 feet: • 3,373 residential parcels; • 2 libraries; • 9 churches; • 1 hospital; and • 4 schools 371 sensitive vibration receptors within 275 feet : • 370 residential parcels; and • 1 church Noise and vibration may impact Bakersfield High School.	3,268 sensitive noise receptors within 700 feet: • 3,247 residential parcels; • 2 libraries; • Bakersfield City Hall; • 14 churches; • 1 hospital; • 3 schools 467 sensitive vibration receptors within 275 feet: • 462 residential parcels; • 5 churches Noise and vibration may affect Mercy Hospital.	Noise impacts are similar to D2-N, but with 21 fewer residential parcels within 700 feet of alignment Vibration impacts are similar to D2-N.
	Visual/scenic resources	60-feet high elevated structure highly visible. Residential parcels within quarter-mile: • Elevated portions of the alignment: 4,376 • Station footprint: 226	Similar to D1-N. Residential parcels within quarter-mile: • Elevated portions of the alignment: 4,639 • Station footprint: Same as D1-N	Similar to D1-N. Residential parcels within quarter-mile: • Elevated portions of the alignment: 4,276 • Station footprint: Same as D1-N	Similar to D1-N. Residential parcels within quarter-mile: • Elevated portions of the alignment: 3,440 • Station footprint: Same as D1-N
	Geotechnical constraints	▪ No known seismic fault crossings, landslide areas within alignment corridor or station footprint. ▪ No erodible soils within alignment corridor.	▪ No known seismic fault crossings or landslide areas within alignment corridor or station footprint. ▪ 1.4 acres of highly erodible soils within alignment corridor west of Fairfax Road.	▪ No known seismic fault crossings or landslide areas within alignment corridor or station footprint. ▪ 0.6 acres of highly erodible soils within alignment corridor west of Fairfax Road.	▪ Same as D2-N.
	Hazardous materials	▪ 3 hazardous materials sites within alignment corridor. ▪ 2 hazardous materials sites within station footprint.	▪ 4 hazardous materials sites within alignment corridor. ▪ Sites within the station footprint same as D1-N.	▪ 9 hazardous materials sites within alignment corridor. ▪ Sites within the station footprint same as D1-N.	▪ Same as D2-N.

Note: Dark gray shading in the table Header indicates which alternatives were not recommended to be carried forward to the environmental review. Gray shading in the table body indicates the reason for that recommendation.

5.0 EVALUATION OF HEAVY MAINTENANCE FACILITY SITES

A Heavy Maintenance Facility (HMF) for High-Speed Train rolling stock will be situated within the Central Valley between Merced and Bakersfield. The fundamental requirements for the HMF are defined by two Authority Technical Memoranda: TM 5.1 "Terminal and HMF Guidelines", and TM 5.3 "Facilities Requirements Summary." In November 2009, based on the specific site and facility requirements, the Authority solicited Expressions of Interest (EOI) from parties between Merced and Bakersfield who could provide proposals where the HMF could be located.

The California HST HMF will support the assembly, testing, commissioning and acceptance of high-speed rolling stock prior to the start-up of operations. After initial operations have begun, the HMF will assume maintenance and repair functions to sustain the regular operation of the system and activation of new rolling stock as it is delivered.

The HMF should be centrally located on the HST main trunk line. It should be situated to support delivery, testing and commissioning on the first completed segment of the network. The HMF will perform the following functions:

- Train-set assembly
- Testing and commissioning
- Train storage
- Inspection
- Maintenance
- Retrofitting
- Overhaul

The HMF concept plan indicates that the site should encompass about 150 acres, to accommodate shops, tracks, parking, administrative offices, roadways, a power substation, and storage areas.

Within the Fresno to Bakersfield Section of the HST system, eight proposals were received, as described in the Table 5-1 and depicted on Figure 5-1.

Four of these sites are recommended to be carried forward for further analysis in the EIS/EIS, as listed below.

- Fresno Works – Fresno.
- Kings County – Hanford
- Kern Council of Governments – Wasco.
- Kern Council of Governments — Shafter Site**.**

Four sites are recommended to not be carried forward into the environmental evaluation, as explained in Table 5-2.

- Schuil & Associates — Angiola.
- City of Allensworth Development Group LLC — Allensworth..
- Watson Touchstone Commercial Development – McFarland.
- MUSE LLC – Bakersfield.

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Table 5-1. Fresno to Bakersfield Section – Heavy Maintenance Facility Proposals (Listed North to South)

Location	Proposer/Sponsor	Location/Description	Property Characteristics	Economic Incentives	Letters of Local Support
Fresno	**Fresno Works (City of Fresno, County of Fresno, Council of Fresno County Governments)**	▪ West side of BNSF Railway alignment between SR-99 and Adams Avenue, south of the City of Fresno. ▪ 696 acres. ▪ Adjacent to/accessible from all alignment alternatives under consideration. ▪ HST tangent track appropriate for yard track turnouts. ▪ Multiple yard configurations possible using some or all of available property.	▪ Appropriate size and shape for HMF. ▪ Not located in floodplain ▪ Roadway access from all directions. No decline in traffic LOS. ▪ Low soil shrink/swell potential. ▪ 0.8 miles from 230 kV power transmission lines. ▪ No endangered species critical habitat. ▪ No impact to 4(f) and 6(f) resources. ▪ Consistent with local plans.	▪ $25 million for acquisition, infrastructure, utilities, and/or construction. ▪ Full array of public infrastructure improvements. ▪ Dedicated funding for roadways maintenance and improvement. ▪ Site located within Enterprise Zone with associated benefits. ▪ Willing to partner with the Authority in a private/public partnership. ▪ Site adjacent to proposed high speed rail industrial park. ▪ Proposed national high-speed rail research and training academy. ▪ Sustainable infrastructure strategies to mitigate storm water runoff.	▪ City of Fresno (City Council Resolution) ▪ Fresno County Board of Supervisors (Resolution) ▪ Congressman Jim Costa ▪ CSU Fresno ▪ Fresno County Employees' Retirement Association ▪ Central Labor Council of Fresno, Madera, Tulare and Kings Counties AFL–CIO ▪ International Brotherhood of Electrical Workers Local 100 ▪ State Center Community College District ▪ San Joaquin Valley Air Pollution Control District ▪ AT&T, Bank of America, and Merrill Lynch
Hanford	**Kings County Economic Development Corporation**	▪ Southeast of City of Hanford, adjacent to and east of SR-43 between Houston Avenue and Idaho Avenue. ▪ 880 acres. ▪ Adjacent to/accessible from all alignment alternatives under consideration. ▪ HST tangent track appropriate for yard track turnouts. ▪ Multiple yard configurations possible using some or all of available property.	▪ Appropriate size and shape for HMF. ▪ Not located in floodplain. ▪ Roadway access from all directions. No decline in traffic LOS. ▪ Low soil shrink/swell potential. ▪ Close proximity to 230 kV power transmission lines. ▪ No endangered species critical habitat. ▪ No impact to 4(f) and 6(f) resources. ▪ Consistent with local plans.	▪ Adjacent to Kings County Enterprise Zone. Zone to be expanded if HMF is operated by a for-profit business. ▪ Subsidized training, employee hiring and screening assistance, including a job fair for staffing. ▪ Eligible for fast-track permitting by Kings County Community Development Agency. ▪	▪ None provided.
Angiola	**Schuil & Associates**	▪ 9 miles south of Corcoran on west side of BNSF (Avenue 112 at Tulare Co. Hwy. J33). ▪ Adjacent to/accessible from all alignment alternatives under consideration. ▪ 29 acres (insufficient size).	▪ Site size and configuration do not meet HMF requirements. ▪ Located on edge of the Tulare lakebed with high expansive potential and high likelihood of liquefaction under seismic loadings. ▪ Vicinity of Pixley NWF.	▪ No proposed economic incentives.	▪ None provided.
Allensworth	**City of Allensworth Development Group LLC**	▪ West side of BNSF tracks approximately one mile south of Allensworth SHP. ▪ 279 acres ▪ Accessible from BNSF west side alignment. ▪ Not accessible from Allensworth Bypass alignment (CAAA). ▪ Track on wide radius curve. Not suitable for yard track turnouts. ▪ Most remote of all sites reviewed (20 miles from Wasco).	▪ Within one mile of Allensworth SHP, a Section 4(f) property. ▪ Located on edge of Tulare lakebed with high expansive potential and high likelihood of liquefaction under seismic loadings. ▪ Adequate size for HMF; however, shape (isosceles triangle) could require stub-end design or sharp reverse curves. ▪ 4.2 miles from 230 kV power transmission lines. ▪ 1 acre wetlands (0.36% of the site). ▪ No endangered species critical habitat.	▪ No proposed economic incentives. ▪	▪ Tulare County Association of Governments ▪ California Assembly Member Connie Conway
McFarland	**Watson Touchstone Commercial Development**	▪ East side of UPRR in McFarland, 25 miles north of Bakersfield; ▪ 630 acres ▪ Not directly accessible from any HST alignment. 6.5-mile spur required.	▪ Site location does not meet HMF requirements. ▪ 2.2 miles from 230 kV power transmission line. ▪ 431 acres in flood plain (68% of site). ▪ 0.3 acres wetlands on site (1% of site).	▪ No proposed economic incentives.	▪ None provided.

Table 5-1. Fresno to Bakersfield Section – Heavy Maintenance Facility Proposals (Listed North to South)

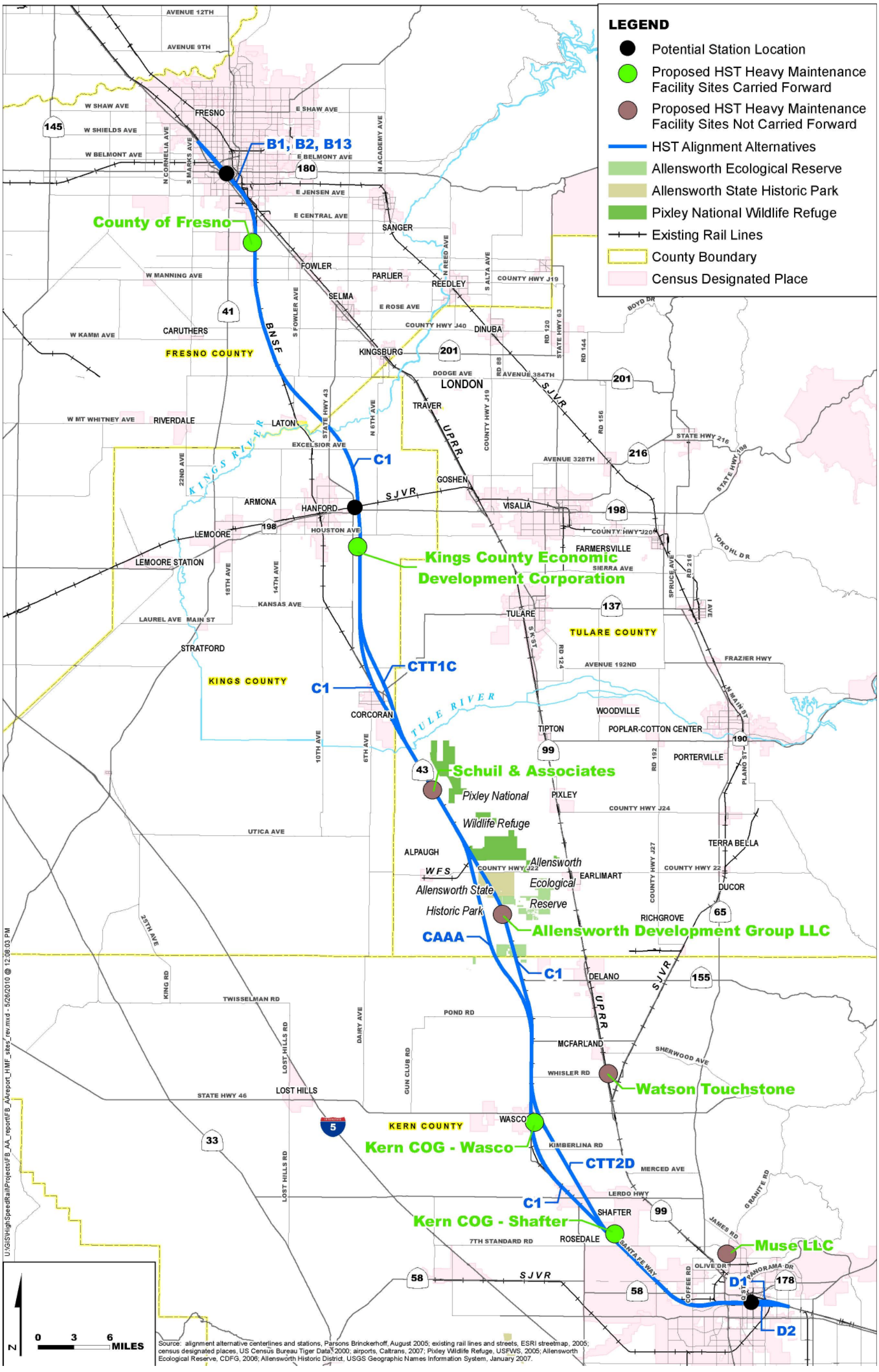
Location	Proposer/Sponsor	Location/Description	Property Characteristics	Economic Incentives	Letters of Local Support
Wasco	**Kern Council of Governments, Kern County, and City of Wasco**	▪ Directly east of City of Wasco between SR-46 and Filburn St. ▪ Access from HST Wasco Through-Town option (CTT2B) (south end of site) and Wasco–Shafter Bypass (CTT2D) option (north end of site). ▪ Through-Town HST on tangent appropriate for yard track turnouts. ▪ Wasco-Shafter Bypass (Option CTT2D) on wide radius curves; not suitable for yard track turnouts. ▪ 421 acres: 154 acres proposed for HMF. Remaining area available for Maintenance-of-Way Facility and Administrative/Train Operations Center.	▪ Appropriate size and shape for HMF. ▪ Not located in floodplain. ▪ Roadway access from all directions. No decline in traffic LOS. ▪ Low soil shrink/swell potential. ▪ 0.6 miles from 230 kV power transmission lines. ▪ No endangered species critical habitat. ▪ No impact to 4(f) and 6(f) resources.	▪ No proposed incentives. ▪	▪ Kern County Board of Supervisors (Resolution) ▪ Kern Council of Governments (Resolution) ▪ Greater Bakersfield Chamber of Commerce ▪ Golden Empire Transit District ▪ CSU Bakersfield
Shafter Site	**Kern Council of Governments, Kern County and City of Shafter**	▪ East of BNSF tracks between Burbank St. and 7th Standard Road. ▪ Potential access from HST Wasco-Shafter Through-Town (CTT2B) option and Wasco–Shafter Bypass (CTT2D) option. Access issues with BNSF need study. ▪ Through-Town HST option (CTT2B) on tangent appropriate for yard track turnouts. ▪ Wasco-Shafter Bypass (CTT2D) on wide radius curve; not suitable for yard track turnouts. ▪ 640 acres: 154 acres proposed for HMF. Remaining area available for Maintenance-of-Way Facility and Administrative/Train Operations Center.	▪ Appropriate size and shape for HMF. ▪ Partially located in flood plain (156 acres or 24% of the site). ▪ Roadway access from all directions. No decline in traffic LOS. ▪ Low soil shrink/swell potential. ▪ Close proximity to 230 kV power transmission lines. ▪ No wetlands. ▪ No impact to 4(f) and 6(f) resources.	▪ Adjacent to International Trade and Transportation Center (Foreign Trade Zone and California Enterprise Zone). ▪ Cost savings from co-locating HMF and maintenance-of-way facility on site. ▪ Capability of collecting daily operations data with GIS lab at CSU Bakersfield. ▪	▪ Kern County Board of Supervisors (Resolution) ▪ Kern Council of Governments (Resolution) ▪ City of Shafter ▪ Greater Bakersfield Chamber of Commerce ▪ Golden Empire Transit District ▪ CSU Bakersfield
Bakersfield	**MUSE LLC**	▪ Near Bakersfield's Meadows Field Airport, 5 miles from downtown Bakersfield. ▪ 52 acres (insufficient size). ▪ Not directly accessible from any HST alignment. 6-mile spur required.	▪ Site location, size, and configuration do not meet HMF requirements. ▪ Inconsistent with the Airport Land Use Commission Plan; aviation easement would be required and building height limits would apply. ▪ Adjacent to crude oil line pipeline operated by Exxon Mobil. ▪ Inconsistent with planned freeway; Bakersfield General Plan Update shows future freeway through the site. ▪ Incompatible (residential) uses nearby.	▪ No proposed economic incentives.	▪ None provided.

Table 5-2. HMF Sites Not Carried Forward — Basis for Recommendations

HMF Location/Sponsor	Findings
Angiola/Schuil & Associates	▪ Site (29 acres) is too small for HMF use. ▪ There is no convenient roadway access to site. ▪ . ▪ Soils have high expansive potential and high likelihood of liquefaction under seismic loadings. ▪ Would Displace 28 acres of farmland of statewide importance (97% of the site).
Allensworth/City of Allensworth Development Group LLC	▪ Site is remote, with poor access to skilled labor, utilities and surface transportation. ▪ Site located near sensitive cultural and environmental resources. ▪ Soils have high expansive potential and high likelihood of liquefaction under seismic loadings. ▪ Allensworth Bypass alignment has no direct access to site.
McFarland/Watson Touchstone Commercial Development	▪ Site located 6.5 miles from nearest alignment alternative. ▪ Located in a flood plain (431 acres or 68% of the site). ▪ No convenient roadway access to the site. ▪ Site is 2.2 miles from nearest 230 kV transmission lines. ▪ Wetlands on the site (0.3 acre or 1% of the site).
Bakersfield/MUSE LLC	▪ Site is located 6 miles from nearest HST alignment alternative.. ▪ Configuration of the site does not meet the estimated spatial requirements of the heavy maintenance facility. ▪ Site contains crude oil line pipeline . ▪ Inconsistent with the Airport Land Use Commission Plan. Aviation easement would be required and height limits would be in effect. ▪ Inconsistent with planned freeway construction. Bakersfield General Plan Update Map shows a future freeway through the site.

Note: Gray shading in the table body indicates the reason for that recommendation.

Figure 5-1. Alternatives Carried Forward and Heavy Maintenance Facility Sites



6.0 SUMMARY AND CONCLUSIONS

6.1. Results from the Preliminary Alternatives Analysis

This Preliminary Alternatives Analysis Report for the Fresno to Bakersfield Section incorporates conceptual engineering information and identifies feasible and practicable alternatives to carry forward for environmental review and evaluation in the draft environmental impact report/environmental impact statement (EIR/EIS) under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). For the purposes of this Alternatives Analysis, the Fresno to Bakersfield section was divided into three subsections from north to south:

- **Fresno Subsection** – Beginning at Clinton Avenue north of downtown Fresno and terminating in the vicinity of E. Manning Avenue south of Fresno.
- **Rural Subsection** – Beginning at E. Manning Avenue in Fresno and continuing south to Hageman Road in the community of Rosedale on the northwestern outskirts of Bakersfield.
- **Bakersfield Subsection** – Beginning at Hageman Road, continuing southeast through downtown Bakersfield and terminating at Oswell Street, southeast of downtown.

The study limits extend for approximately three miles north of the Fresno station and three miles southeast of the Bakersfield station in order to fully consider alignment alternatives in those areas. In both cases, the limits correspond to points where multiple options are reduced to a single alignment for a short distance.

A Heavy Maintenance Facility (HMF) for High-Speed Train rolling stock will be situated within the Central Valley between Merced and Bakersfield. In November 2009, based on specific site and facility requirements, the Authority solicited Expressions of Interest (EOI) from parties between Merced and Bakersfield who could provide proposals where the HMF could be located. Within the Fresno to Bakersfield Section of the High-Speed Train (HST) system, proposals for eight sites were received.

The following alignment alternatives are recommended to be carried forward for detailed study in the Fresno to Bakersfield Section HST Project EIR/EIS.

- **Fresno Subsection**
  - Elevated UPRR West / BNSF South
  - Elevated UPRR East / BNSF South
  - UPRR West/UPRR East Crossover Alternative (Combination of UPRR West and UPRR East)

- All recommended alternatives through Fresno are elevated, run adjacent to the Union Pacific Railroad, and provide for a station in downtown Fresno near Mariposa Street, the City's desired location.

- **Rural Subsection**

  Full-Length Alignment
  - BNSF Route, West Side Shared Right-of-Way, Bypass east side of Hanford

  - Local Options
    - Through Corcoran, East Side of BNSF, Elevated
    - Corcoran East Bypass, At-Grade
    - Allensworth Bypass Alternative, At-Grade (west of BNSF corridor)
    - Through Wasco and Shafter, Elevated
    - Wasco and Shafter Bypass, At-Grade

- Recommended Rural Subsection alternatives are largely at grade and parallel the existing BNSF Railway where possible, including sections where BNSF right-of-way is shared. Through-town (elevated) and bypass (at-grade) options are retained in the vicinity of small communities (Corcoran, Wasco, and Shafter). A bypass alternative is also provided in the vicinity of Allensworth State Historic Park and Pixley National Wildlife Refuge. All alternatives allow for a station in Kings County east of Hanford at SR-198.

- **Bakersfield Subsection**
  - Through BNSF Yard, North of East Bakersfield, South of UPRR, Elevated
  - North of BNSF ROW, along California Avenue through East Bakersfield, South of UPRR, Elevated

- Recommended Bakersfield alternatives are both elevated; have slightly differing locations with respect to existing BNSF mainline and yard, major downtown buildings, and the low income community of East Bakersfield; and provide for a station adjacent to or near the existing Truxtun Avenue Amtrak station.

Heavy Maintenance Facility sites recommended for continued study are:

- Fresno Works – Fresno
- Kings County – Hanford
- Kern Council of Governments – Wasco
- Kern Council of Governments — Shafter

Table 6-1 summarizes the findings and recommendations of this Alternatives Analysis for all alignment alternatives and HMF site alternatives considered.

6.2. Next Steps

This Preliminary Alternatives Analysis Report Fresno to Bakersfield Section informs the Project Description for the EIR/EIS. It also sets parameters for the next level of design and environmental analysis. This ongoing work will provide the Authority, FRA and the communities in Fresno to Bakersfield Section more details and a fuller picture of both the design options in each subsection and a comprehensive vision of the entire corridor.

As the engineering and environmental work continues, the Authority will continue to meet and engage communities along the Fresno to Bakersfield corridor in a discussion about the different alternatives. If deemed necessary by the lead agencies, a supplemental Alternative Analysis report will consider feedback received on this Preliminary Alternative Analysis report and will discuss how the alternatives analysis will inform the detailed engineering, environmental and outreach activities in the Fresno to Bakersfield corridor. These activities will inform preparation of the draft EIR/EIS, which is currently scheduled for public comment in December 2010.

Table 6-1 Alignment Alternatives and Heavy Maintenance Facility Sites Considered

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS		AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
		Carried Forward	Withdrawn	Construction	Incom-patibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
Fresno Subsection											
UPRR West / Elevated / BNSF	B1	X									Visual and noise impacts; impact on 4(f) property (Roeding Park). Station further from downtown core (less desirable).
UPRR East / Elevated / BNSF	B2	X									Visual and noise impacts; impact on historic 4(f) property (SP Depot Building). Station closest to downtown core (desired City location).
Golden State Blvd / Elevated / BNSF	B3		X		P		S		S		Extensive community and cultural impact; located away from urban core; not preferred by City and stakeholders; more costly and complex construction.
UPRR West / Elevated / UPRR	B4		X		S					P	Not compatible with selected alignments in Rural Subsection.
UPRR East / Elevated / UPRR	B5		X		S					P	Not compatible with selected alignments in Rural Subsection.
Golden State Blvd / Elevated / UPRR	B6		X		P		S		S	S	Community and cultural impacts; located away from downtown urban core; not preferred by City and stakeholders; costly and complex construction.
UPRR West / Mixed At-Grade & Elevated / BNSF	B7		X	P						S	Displacements; road network severance; noise; community barrier effects.
UPRR East / Mixed At-Grade & Elevated / BNSF	B8		X	P						S	Displacements; road network severance; noise; community barrier effects.
Golden State Blvd/Mixed At-Grade & Elevated/BNSF	B9		X		P		S		S	S	Greatest community and cultural impact; located away from urban core; not preferred by City and stakeholders; costly and complex construction.
UPRR West / Mixed At-Grade & Elevated / UPRR	B10		X	S						P	Not compatible with selected alignments in Rural Subsection.
UPRR East / Mixed At-Grade & Elevated / UPRR	B11		X	S						P	Not compatible with selected alignments in Rural Subsection.
Golden State Blvd/Mixed At-Grade & Elevated/UPRR	B12		X		P		S		S	S	Community and cultural impacts; located away from downtown urban core; not preferred by City and stakeholders; costly and complex construction.
UPRR West/UPRR East Crossover	B13	X									Visual and noise impacts; costly and complex construction. No impacts on 4(f) properties. Station further from downtown core (less desirable).
Rural Subsection											
Full-Length Alignment Alternatives											
BNSF-Hanford East Bypass / Shared ROW	C1	X									Greater construction complexity and cost; more coordination and mitigation of BNSF operational impacts required.
BNSF-Hanford East Bypass / Separate West Side Alignment	C2		X			S			P	S	Alternative has greater ROW requirements and impacts more agricultural lands and natural resource lands than "Shared ROW" alternative. Separate HST ROW not feasible within rural communities of Corcoran, Wasco, and Shafter.
BNSF-Hanford East Bypass / Separate East Side Alignment	C3		X			S			P	S	Alternative has greater ROW requirements and impacts more agricultural lands and natural resource lands than "Shared ROW" alternative. Separate HST ROW not feasible within rural communities of Corcoran, Wasco, and Shafter.
UPRR to BNSF / Shared ROW	C4		X		P		S		S	S	UPRR corridor not selected due to (1) deviation from preferred Program EIR/EIS alignment, (2) extensively greater Greenfield construction, (3) moderately greater impacts on agricultural lands, and (4) greater cost and construction complexity.
UPRR to BNSF / Separate West Side Alignment	C5		X		P		S		S	S	UPRR corridor not selected due to (1) deviation from preferred Program EIR/EIS alignment, (2) extensively greater Greenfield construction, (3) moderately greater impacts on agricultural lands, and (4) greater cost and construction complexity.
UPRR to BNSF / Separate East Side Alignment	C6		X		P		S		S	S	UPRR corridor not selected due to (1) deviation from preferred Program EIR/EIS alignment, (2) extensively greater Greenfield construction, (3) moderately greater impacts on agricultural lands, and (4) greater cost and construction complexity.
Local Alignment Options											
Fowler/Selma/Kingsburg Greenfield Bypass	CBPA		X		P		S		S	S	Not compatible with selected full-length alignment alternative.
Fowler/Selma/Kingsburg Near-Town Bypass	CBPB		X		P		S		S	S	Not compatible with selected full-length alignment alternative.
Visalia 198 East Station Alignment	CVSA		X		P		S		S	S	Not compatible with selected full-length alignment alternative.
99 Center Station (South of 198) Alignment	CVSB		X		P		S		S	S	Not compatible with selected full-length alignment alternative.
99 North Station (Goshen) Alignment	CVSC		X		P		S		S	S	Not compatible with selected full-length alignment alternative.
BNSF Hanford West Bypass (Modified Program Alignment)	CPAA		X		S				P	S	Has agricultural impacts similar to Hanford East Bypass; conflicts with local land use plans; station site poorly serves Visalia Tulare area.

Table 6-1 Alignment Alternatives and Heavy Maintenance Facility Sites Considered

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS		AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
		Carried Forward	Withdrawn	Construction	Incom-patibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
Corcoran Through Town (At-Grade)	CTT1A		X	P			S		P		Major intrusion through small community; loss of road network connectivity; extensive commercial and some residential displacement; inconsistent with BNSF operations and service to local customers; at-grade construction is costly and complex.
Corcoran Through Town (Elevated)	CTT1B	X									Visual and noise impacts; mitigation of BNSF numerous operations issues required; more complex and costly construction than bypass alternative.
Corcoran Bypass East Side of Town	CTT1C	X									Agricultural land acquisition and operations impacts; rural/county roadway network impacts.
Allensworth Bypass (West)	CAAA	X									Greater impact on agricultural lands and that BNSF shared-ROW alternative; avoids numerous 4(f) resources (Allensworth SHP, Pixley NWF, and Allensworth Ecological Reserve); potentially greater impact on natural resources.
Wasco/Shafter Through Town (At-Grade)	CTT2A		X	P			S		P		Major intrusion through small community; loss of road network connectivity; extensive commercial and some residential displacement; inconsistent with BNSF operations and service to local customers; at-grade construction is costly and complex.
Wasco/Shafter Through Town (Elevated)	CTT2B	X									Visual and noise impacts; mitigation of BNSF numerous operations issues required; more complex and costly construction than bypass alternative.
Wasco East Bypass, Through Shafter (At-Grade)	CTT2C		X	P			S		P		Major intrusion through small community; loss of road network connectivity; extensive commercial and some residential displacement; inconsistent with BNSF operations and service to local customers; at-grade construction is costly and complex.
Wasco/Shafter East Bypass (At-Grade)	CTT2D	X									Agricultural land acquisition and operations impacts; rural/county roadway network impacts.
Wasco/Shafter Through Town (Elevated in Wasco At-Grade in Shafter)	CTT2E		X	P			S		P		Major intrusion through small community; loss of road network connectivity; extensive commercial and some residential displacement; inconsistent with BNSF operations and service to local customers; at-grade construction is costly and complex.
Wasco/Shafter Through Town (At-Grade in Wasco Elevated in Shafter)	CTT2F		X	P			S		P		Major intrusion through small community; loss of road network connectivity; extensive commercial and some residential displacement; inconsistent with BNSF operations and service to local customers; at-grade construction is costly and complex.
Wasco/Shafter/7th Standard Road East Bypass	CTT2G		X			S			P	S	Greenfield alignment; extensive acquisition of agricultural lands; impact on major planned and permitted mixed use development.
Bakersfield Subsection											
Through BNSF Yard / Adjacent to Amtrak Station / North of UPRR	D1-N		X	P	S				S		Impacts on downtown activities and structures, including Bakersfield High School; impact on commercial property on north side of UPRR ROW; costly and complex construction to pass over UPRR right-of-way and Edison Hwy south of Kern Junction.
Through BNSF Yard / Adjacent to Amtrak Station / South of UPRR	D1-S	X									Displacement of building on Bakersfield High School campus; visual and noise impacts throughout Bakersfield.
North of BNSF Right-of-Way/ One Block South of Amtrak Station / South of UPRR	D2-N	X									Visual and noise impacts throughout Bakersfield; residential and commercial displacement in East Bakersfield (EJ community).
Over BNSF Main Line / One Block South of Amtrak Station / South of UPRR	D2-S		X	P					S		Impacts on downtown activities and structures, including Bakersfield High School; impact on east Bakersfield EJ community greater than alignments carried forward; costly and complex construction to pass over BNSF mainline across downtown Bakersfield.
Heavy Maintenance Facility Sites (North to South)											
Fresno Works – Fresno		X									Acquisition of agricultural land.
Kings County EDC – Hanford		X									Acquisition of agricultural land.
Schuil & Associates – Angiola			X	P							Insufficient size; near sensitive natural resources; limited access to utilities and workforce; incompatible soils.
City of Allensworth Development Group LLC – Allensworth			X				S			P	Located near sensitive natural and cultural resources; most remote site: limited access to utilities and workforce; not accessible from Allensworth Bypass alignment; located on curve making connection difficult; poor soils.
Watson Touchstone Commercial Development – McFarland			X				P			S	Located 6.5 miles from nearest HST alignment alternative; 65% of site is within 100-year floodplain.
Kern Council of Governments – Wasco		X									Acquisition of agricultural land.
Kern Council of Governments – Shafter		X									Acquisition of agricultural land.
MUSE LLC – Bakersfield			X	S			P				Located 6 miles from nearest HST alignment; insufficient size; inconsistent with current and planned land use; inconsistent with freeway plans.

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